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THE

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MINUTES

OF THE

ELEVENTH ANNUAL MEETING

OF THE

AMERICAN MEDICAL ASSOCIATION,

HELD IN THE CITY OF WASHINGTON, MAY 4, 1858.

THE Association met at 9 o'clock A. M., in the Lecture Room of the Smithsonian Institution, the President, Dr. PAUL F. EVE, of Tennessee, in the chair, supported on either side by Drs. D. MEREDITH REESE, of N. Y., and H. FRASER CAMPBELL, of Georgia, Vice-Presidents, and Drs. ROBERT C. FOSTER, of Tennessee, and A. J. SEMMES, of Washington City, Secretaries.

The President announced the Rev. Dr. SUNDERLAND, of Washington City, who opened the proceedings with prayer.

The President having announced that Reports were in order, Dr. HARVEY LINDSLY, Chairman of the Committee of Arrangements, on behalf of the Medical Profession of the District of Columbia, in a few appropriate remarks, extended a sincere and cordial welcome to the members of the Association, as follows:—

Mr. President and Gentlemen of the American Medical Association: In behalf of the Medical Profession of the District of Columbia, I proffer you a cordial and hearty welcome to this, the political metropolis of our common country.

It would have been highly gratifying to us to have done this several years since, if it had been consistent with the claims of other more favored places for you then to have accepted our invitation, so cordially extended to you, to meet in Washington.

It is now some twelve years since the organization of your Asso-

ciation—and the annual meetings which, during that period, have been regularly held in every part of our extended country, have been reunions of kindred spirits, at once pleasant and instructive. Harmony has ever characterized your proceedings. Assembling from the remotest sections of the republic—from the Kennebec to the Rio Grande—from the Atlantic coast to the El Dorado of the West, you have met, as men devoted to the pursuit of science and philanthropy should always meet, in a spirit of union and concord.

You have left, for a few brief hours, the toils and privations of a laborious profession, in order, by a concentration of effort and interchange of opinion, to enlarge the boundaries of science and extend the usefulness of your calling. You are determined not to lag behind in this age of progress and discovery. You are resolved to effect everything that the most resolute determination and the most persevering industry can accomplish, for the promotion of knowledge and the good of mankind. Each revolving year witnesses important discoveries in physiology and medical chemistry, useful additions to our materia medica, new and valuable appliances and operations in surgery, more correct and philosophical views of disease—and, most important of all, improved modes and greater skill in its treatment.

You will return from these annual gatherings with fresh spirit and renewed hopes—with greater zeal and enlarged facilities for the advancement of your profession—and with redoubled energy to bear the sacrifices and endure the labor which its successful prosecution demands. Yours is emphatically a profession of self-denial and self-sacrifice. Much of your time is devoted to the care of patients, where your only reward is the consciousness of duty discharged and suffering relieved. You visit with equal solicitude the humble and the elevated—the hovels of the poor and the mansions of the rich.

"Pauperum tabernas, regumque turres."

We have not much, as yet, gentlemen, in our young and growing city, to claim the attention of the votary of medical science. We have no hospitals with extensive wards and ample endowments, enriched by the benefactions of the benevolent and the accumulated wealth of centuries—no ancient and venerable Universities with extensive apparatus, splendid museums or immense anatomical collections to interest and instruct you. We have done, however, what we could, and whatever we have is open to all without

restriction of sect or locality. But the day is not far distant, we trust, when, by the liberality of a great people, our public buildings, our literary and scientific institutions, our national parks and botanic gardens will be worthy of the grand metropolis of a nation, which, perhaps within the next half century, will be the most populous, powerful, and wealthy in Christendom.

But whatever may be our deficiencies, we can at least present you one spectacle which can be witnessed nowhere else—a sight worth a pilgrimage from the remotest bounds of the republic—we can show you the Home of Washington—that Mecca of the American people, to which every patriotic heart will ever turn with sentiments of devoted affection and filial reverence.

Again, gentlemen, we welcome you to the hospitalities of our firesides, and the still warmer affections of our hearts.

On motion, the list of Delegates, so far as it could be made, was then read by the Secretary; and twenty-five States, the District of Columbia, the Medical Staff of the U. S. Navy, and the American Medical Society in Paris, were represented.

The following list comprises the names of all the delegates, permanent members, and members by invitation, in attendance at any one period during the meeting of the Association.

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Maine Medical Association,	JAMES MCKEEN, JOB HOLMES, THOMAS FRYE.

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Manchester Medical Association,	E. H. DAVIS.
South District Medical Society,	HARRISON EATON.

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Vermont State Medical Society,	P. PINEO, SAMUEL W. THAYER, JR.

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Massachusetts General Hospital and Boston Society for Medical Improvement,	Henry G. Clark.
Essex North District Med. Society,	Seneca Sargent.
Boston Society for Medical Observation,	Henry J. Bowditch.
Thurber Medical Association,	H. Carpenter, A. C. Fay.
Norfolk County Med. Society,	Jonathan Ware.

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Deer Island Hospital,	JOHN M. MORIARTY.
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Hampden District Med. Society,	C. C. CHAFFIN.
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University of Michigan,	A. B. PALMER, ABNER SAGER.
U. S. Marine Hospital, Detroit,	ZINA PITCHER.
Permanent Member,	DWIGHT NIMS.

ILLINOIS.

State Medical Society,	H. NOBLE, Z. H. MADDEN, D. E. FOOTE.
Cooke Co. Medical Society,	SWAYNE WICKERSHAM, JNO. L. PAGE, FRAS. W. WHITE.
Rush Med. College, Chicago,	N. S. DAVIS, J. H. RUNCH.
McLean Co. Med. Society,	A. H. LUCE.
Aurora City Med. Society,	A. HARD.
Ottawa City Med. Society,	CHESTER HARD.
Dewitt Co. Med. Society,	C. GOODBRAKE.
Esculapian Society,	D. W. STORMONT.

MISSOURI.

St. Louis Med. Society,	MONTROSE A. PALLEN, C. A. POPE, J. R. WASHINGTON, W. M. MCPHEETERS.
Member by Invitation,	G. C. SWALLOW.

IOWA.

Dubuque Medical Society,	TOM. O. EDWARDS.
Permanent Member,	ASA HORR.

WISCONSIN.

Permanent Member,	D. COOPER AYRES.

CALIFORNIA.

State Medical Society, O. HARVEY.

U. S. NAVY.

U. S. Navy, { CHAS. D. MAXWELL, GEORGE CLYMER.

U. S. ARMY.

U. S. Army, { RO. C. WOOD, N. S. JARVIS.

AMERICAN MED. SOCIETY IN PARIS.

Am. Med. Society in Paris, D. R. HAGNER.

Dr. HARVEY LINDSLY, Chairman of the Committee of Arrangements, reported that the sessions would be held from nine A. M. to three P. M.; also, that the President of the United States would be happy to receive the members of the Association and their ladies at the Executive Mansion, in the evening at 8 o'clock.

Dr. J. M. SNYDER, of Georgetown, was added, on motion, to the Committee of Arrangements.

Dr. H. LINDSLY moved, that in order to furnish each State delegation an opportunity to choose a member to represent them on the Nominating Committee, a recess of fifteen minutes be taken, which was agreed to; and, at the conclusion of which, the following gentlemen were reported for the committee:—

JOB HOLMES, Maine,
G. H. HUBBARD, N. Hampshire,
P. PINEO, Vermont,
E. ALDEN, Massachusetts,
A. WOODWARD, Connecticut,
J. MAURAN, Rhode Island,
H. D. BULKLEY, New York,
J. P. COLEMAN, New Jersey,
ISAAC HAYS, Pennsylvania,
H. F. ASKEW, Delaware,
S. P. SMITH, Maryland,
N. YOUNG, District of Columbia,
A. S. PAYNE, Virginia,
W. H. MCKEE, North Carolina,
W. T. WRAGG, South Carolina,
JOS. P. LOGAN, Georgia,
J. T. HARGRAVES, Alabama,
R. J. BRECKINRIDGE, Kentucky,
J. B. LINDSLEY, Tennessee,
W. M. MCPHEETERS, Missouri,
GEO. MENDENHALL, Ohio,
CALVIN WEST, Indiana,
A. H. LUCE, Illinois,
ZINA PITCHER, Michigan,
THOS. O. EDWARDS, Iowa,
O. HARVEY, California,
GEO. CLYMER, U. S. Navy.

Dr. PITCHER, of Michigan, moved that the U. S. Army and Navy be entitled to representation on the Nominating Committee. After some discussion by Drs. MILLER, of New York, and CONDIE, of Pennsylvania, the Chair decided in favor of their representation. This decision was appealed from; but a vote being taken, the Chair was sustained.

Upon motion, a Committee of Voluntary Essays was then appointed, consisting of Drs. BOHRER, of District of Columbia, FLINT, of New York, and HARGRAVES, of Alabama.

The Chair announced that Dr. D. MEREDITH REESE, of New York, one of the Vice-Presidents of the Association, desired permission to make a communication, which, having been granted, Dr. REESE read the following statement:—

"*To the Officers and Members of the American Medical Association*—

"The undersigned, one of the Vice-Presidents of the American Medical Association, having, during the interval since our last annual meeting, certified to the professional fitness for the charge of the Blockley Hospital, at Philadelphia, of an individual who had been expelled from this body for a violation of our code of ethics, after consultation with the other officers, and yielding to the advice of other personal friends, desires to say to the Association now assembled—

"1st. That, in giving said certificate, he was prompted solely by motives of sympathy and humanity to a fallen brother, who had been a personal friend prior to his offence; and that he did not realize, acting under the impulse of the moment, that his individual act could be construed by the profession as indicating hostility to his brethren.

"2d. That while his own mind is clear that his certificate contained only the truth, and that, under his peculiar relations to the party concerned, he could not withhold his certificate of medical qualification, consistent with conscience and duty, yet he is ready to concede that he had no abstract right to relieve the party from the censure of the Association until this body had restored him to its fellowship.

"3d. That, so far from intending any disrespect to the Association, or to its act of discipline, the undersigned had publicly sustained and defended both. He therefore disclaims the inference from his certificate that he intended to recommend to a high pro-

fessional office a man whom the Association had excluded, and thereby nullify the action of this body.

"And, finally, with these statements and disclaimers, the undersigned, while retaining his own opinion of the rectitude of his motives, and of his duty, under the peculiar circumstances of the case, is nevertheless prepared to defer to the judgment of those whom he knows to be his friends, that he erred in doing what he had no right to do, in view of his official position in the Association, and is hence called upon to offer this explanation and apology to his brethren. DAVID M. REESE."

Dr. CONDIE, of Pennsylvania, moved that the apology be received. A substitute was offered by way of amendment to this motion, declaring that the Code of Ethics of the Association had been violated. The amendment was not agreed to; and the original motion of Dr. CONDIE was adopted.

On motion of Dr. ATLEE, of Pennsylvania, the statement of Dr. REESE was ordered to be entered upon the minutes.

Dr. JAMES BRYAN, of Pennsylvania, said that he was in the same position with Dr. REESE, and offered a similar statement, which was, on motion of Dr. CONDIE, of Pennsylvania, received.

On motion of Dr. LINDSLEY, of D. C., Dr. PAUL F. EVE, of Tennessee, the retiring President, delivered the annual address.

On motion of Dr. ATLEE, of Pennsylvania, the President was requested to furnish a copy of his address for publication in the *Transactions* of the Association.

Reports from Standing Committees being in order, Dr. GRAFTON TYLER, of D. C., Chairman of the Committee on Prize Essays, submitted the following report:—

"The Committée on Prize Essays report, that the essays received were three in number, each of which has been examined by them with great care, considering, first, the intrinsic merits of each essay, and then, their merits in relation to each other.

"The Committee have discharged the responsible and delicate duty imposed upon them, with a consciousness of its great importance, and are gratified to be able to declare two of the essays submitted to their consideration, in their judgment, each worthy of a prize. The third they also highly commend.

"The Committee award the first prize to the essay entitled 'An Essay on the Clinical Study of the Heart-Sounds, in Health and Disease.' It bears the motto, '*Clinica clinicé demonstrandum.*'

"They award the second prize to the essay entitled 'An Essay on Vision, and some of its Anomalies, as revealed by the Ophthalmoscope." It bears the motto, '*Dux Hominum, medicus est.*'

GRAFTON TYLER,
(J.) J. C. HALL,
JNO. FRED. MAY,
THOMAS MILLER,
JOSHUA RILEY,
W. J. C. DUHAMEL,
A. J. SEMMES,
Committee on Prize Essays."

On motion, the report was accepted, and the essays were referred to the Committee on Publication. Dr. G. TYLER then, in the presence of the Association, opened the sealed packets, disclosing the names of the authors; and found the "Essay on the Clinical Study of the Heart-Sounds, in Health and Disease," to which was awarded the first prize, to have been written by Dr. AUSTIN FLINT, of Buffalo, N. Y.; and the "Essay on Vision, and some of its Anomalies, as revealed by the Ophthalmoscope," to which was awarded the second prize, to have been written by Dr. MONTROSE A. PALLEN, of St. Louis, Missouri.

Upon the motion of Dr. PALMER, of Michigan, and by general consent, Drs. FLINT and PALLEN each favored the Association with a brief synopsis of their essays.

Dr. LINDSLY, from the Committee of Arrangements, presented a letter from Capt. M. C. MEIGS, U. S. Engineers, calling the attention of the Association to the subject of Ventilation, and inviting the members to visit the capitol extension, with a view to its examination, in this connection; also, a letter from Dr. C. H. NICHOLS, in charge of the U. S. Hospital for the Insane of the Army and Navy, and of the District of Columbia, inviting the members to visit that establishment; and a communication from the Rev. BERNARD A. MAGUIRE, S. J., President of Georgetown College, inviting the Association to visit that Institution.

On motion of Dr. HAMMOND, of N. Y., these several invitations were accepted, and the thanks of the Association were accorded therefor.

On motion of Dr. H. LINDSLY, Chairman of the Committee of Arrangements—

The Hon. GRAHAM N. FITCH, M. D., U. S. Senator from Indiana,

U. S. House of Representatives.
- Hon. C. C. CHAFFIR, M. D., of Massachusetts,
- " ISAIAH D. CLAWSON, M. D., of New Jersey,
- " G. R. ROBBINS, M. D., of " "
- " HENRY M. SHAW, M. D., of N. Carolina,

Hon. PETER PARKER, M. D., late U. S. Commissioner to China, and Dr. HENRY DEAR, of Maryland, were invited to take seats as members by invitation.

It was moved and unanimously agreed to, that Assistant Surgeon FRED. H. ROSE, of Her Britannic Majesty's Navy, be invited to take a seat upon the platform with the officers, as a member of the Association.

Dr. FRANCIS GURNEY SMITH, of Pennsylvania, Chairman of the Committee on Publication, submitted his report, which was read, adopted, and referred to the Committee on Publication.

Dr. CASPAR WISTER, of Pennsylvania, the Treasurer, presented his Annual Report, with the accompanying resolutions:—

Resolved, That on or after each annual meeting, the back volumes of *Transactions*, for sale by the Association, shall be sold at two dollars apiece to permanent members, except the volume published the preceding year—this to continue at the price paid for it by delegates until the next annual meeting; and also,

Resolved, That as Vols. V., VII., VIII. and IX., are in great excess, these four collectively may be had by any permanent member who shall remit $5.00 to the Treasurer; which, with the report, were adopted, and referred to the Committee on Publication.

Dr. GEO. W. NORRIS, of Pennsylvania, Chairman of the Committee on Medical Education, not being present to report, the subject was referred to the Committee on Nominations.

Dr. A. B. PALMER, of Michigan, Chairman of the Committee on Medical Literature, was granted permission to make his report to-morrow morning at 10 o'clock.

The Committee on Nominations, through their Chairman, Dr. THOS. O. EDWARDS, of Iowa, reported in part, as follows, which report was, on motion, unanimously adopted:—

PRESIDENT,

HARVEY LINDSLY, *District of Columbia.*

VICE-PRESIDENTS,

W. L. SUTTON, *Kentucky*,
THOS. O. EDWARDS, *Iowa*.
JOSIAH CROSBY, *New Hampshire*,
W. C. WARREN, *North Carolina*.

SECRETARY,
ALEX. J. SEMMES, *District of Columbia.*

TREASURER,
CASPAR WISTER, *Pennsylvania.*

On motion, a Committee of three, consisting of Drs. FLINT, of New York, GROSS, of Pennsylvania, and GIBBES, of South Carolina, was appointed by the Chair to conduct the newly-elected officers to their seats.

The newly-elected President, Dr. HARVEY LINDSLY, on taking his seat, returned his sincere thanks to the Association for the undeserved and unexpected honor they had conferred upon him.

On motion, the thanks of the Association were unanimously accorded to the retiring officers, for the able manner in which they had performed their duties; and they were also invited to take seats upon the platform.

On motion of Dr. PALMER, of Michigan, it was ordered that the Special Committee on Medical Education (Dr. JAS. R. WOOD, of New York), report Wednesday morning, immediately after the report on Medical Literature.

Next in order, were reports from the Committees on Medical Topography and Epidemics, from each of the several States of the Union. The report from Maine was referred to the Committee on Nominations.

New Jersey being called, Dr. LYNDON A. SMITH, Chairman of the Committee, read extracts from his report, which was referred to Committee on Publication.

The Association then, on motion, adjourned.

SECOND DAY. WEDNESDAY, *May* 5, 1858.

The Association met at 9 o'clock A. M., pursuant to adjournment, the President, Dr. H. LINDSLY, in the Chair.

The Secretary read the minutes of yesterday's proceedings, which were approved.

On motion of Dr. JOHN WATSON, of New York, Dr. DELAFIELD, of New York, one of the first officers of the Association, was invited to take a seat on the platform.

Dr. THOS. P. ATKINSON, of Virginia, submitted the following:—

Resolved, That the Constitution of this Association be so amended as to provide, that no individual who shall be under sentence of

expulsion or suspension from any State or Local Medical Society, of which he may have been a member, shall be received as a delegate to this body, or be allowed any of the privileges of a member, until he shall have been relieved from said sentence by such State or Local Society.

The President decided that under the Constitution, amendments to it must lie over one year, and the resolution was accordingly laid on the table, for consideration at the next annual meeting.

On motion of Dr. PAUL F. EVE, of Tennessee, Dr. WILLIAM M. CUMMING, of Georgia, for some time missionary physician to China, was received as a member by invitation.

On motion of Dr. G. M. DOVE, of the Committee of Arrangements, Drs. H. HUPP and A. L. KNIGHT were admitted to seats as members by invitation.

Dr. A. B. PALMER, of Michigan, Chairman of the Committee on Medical Literature, submitted his report. Its full reading was dispensed with, and the whole report was accepted, and referred to the Committee on Publication.

On motion of Dr. S. D. GROSS, of Pennsylvania, Dr. N. BOZEMAN, of Alabama, was received as a member by invitation.

Dr. JAMES R. WOOD, of New York, Chairman of the Special Committee on Medical Education, submitted his report, which was read, with the following resolutions:—

Resolved, That the several medical colleges of the United States be requested to send delegates to a convention to be held at on the day of for the purpose of devising a uniform system of medical education.

Resolved, That the present report of the Special Committee on Medical Education be referred to such convention for its consideration.

Resolved, That said convention of delegates from the several colleges of the United States be requested to submit to the meeting of this Association in May, 1859, the result of their deliberations.

On motion, the report was accepted and referred to the Committee on Publication; and the accompanying resolutions were laid on the table.

Dr. THOS. O. EDWARDS, of Iowa, submitted the following partial report:—

The Chairman of the Committee on Nominations begs leave to

report, that the Committee recommend Louisville, Kentucky, as the next place of meeting of the Association.

SECRETARY.

S. M. BEMISS, *of Kentucky.*

Standing Committees.

Committee on Publication.—FRANCIS G. SMITH, of Philadelphia, Chairman; CASPAR WISTER, of Philadelphia; A. J. SEMMES, of Washington, D. C.; S. M. BEMISS, of Louisville, Kentucky; SAMUEL L. HOLLINGSWORTH, of Philadelphia; SAMUEL LEWIS, of Philadelphia, and H. F. ASKEW, of Delaware.

Committee on Medical Literature.—JOHN WATSON, of New York, Chairman; LYNDON A. SMITH, of New Jersey; C. G. COMEGYS, Ohio; R. W. GIBBES, South Carolina; W. M. MCPHEETERS, Missouri.

Committee on Prize Essays.—J. B. FLINT, Louisville, Kentucky Chairman; M. GOLDSMITH and HENRY MILLER, Louisville, Ken tucky; ASBURY EVANS, Covington, Kentucky; CALVIN WEST Indiana.

Committee of Arrangements.—R. J. BRECKINRIDGE, Louisville Kentucky, Chairman; G. W. RONALD, B. M. WIBLE, D. W. YAN DELL, D. D. THOMSON, N. B. MARSHALL, G. W. BAYLESS, R. (HEWITT, A. B. COOK.

Committee on Medical Education.—GEO. W. NORRIS, Philadelphi Chairman; A. H. LUCE, Illinois; E. R. HENDERSON, of Sout Carolina; G. GRANT, Tennessee; T. S. POWELL, of Georgia.

The report of the Committee was accepted, the nominations we confirmed, and the Committee were granted permission to s again.

On motion of Dr. COMEGYS, of Ohio, the resolutions submitted l the Special Committee on Medical Education were taken from t table for consideration.

A long discussion ensued, upon a motion of Dr. HAMILTON, New York, to refer the resolutions to a committee, consisting of o member from each delegation representing a medical college, the members to be named by the college delegates present, and to port on Thursday morning at 10 o'clock.

The debate on the subject was terminated by the operation the previous question, which was moved by Dr. FOSTER, of T nessee, and the motion of Dr. HAMILTON was agreed to.

On motion of Dr. LYNDON A. SMITH, of New Jersey, a vote of thanks was accorded to Dr. ROBERT C. FOSTER, the retiring Secretary, for his valuable services; and Dr. S. M. BEMISS, of Kentucky, one of the newly-elected Secretaries, took his seat.

Dr. JOHN F. LAMB, of Pennsylvania, moved that the vote by which the motion of Dr. D. FRANCIS CONDIE, of Pennsylvania, accepting the apology of Dr. D. MEREDITH REESE, of New York, was carried, be reconsidered.

The President decided that a reconsideration was not in order, without a suspension of the rules.

A motion to suspend the rules was made, and a division being called, there were found 111 votes in favor of the motion, and 82 against it. The Chair declared that the rules were not suspended, two-thirds not having voted in the affirmative.

An appeal was taken from this decision, and the decision of the Chair was reversed; and the motion of Dr. LAMB to reconsider was agreed to, by a vote, on a division, of yeas 142, nays 70.

On motion, the case of Dr. BRYAN, of Pennsylvania, was laid on the table.

Dr. BECK, of Indiana, moved an indefinite postponement of the whole subject. The Chair decided that debate on this motion was not in order.

Dr. JEWELL, of Pennsylvania, rose to a point of order, when the Chair reversed its decision.

Dr. JEWELL then proposed to read the memorial upon the subject of the Philadelphia County Medical Society, when Dr. BIDDLE, of Pennsylvania, objected to it, as out of order.

The President decided that the objection was not well taken, from which decision Dr. BIDDLE appealed.

The appeal was not submitted, and upon motion, the Association went into Committee of the Whole, for the consideration of the whole subject of the apology of Dr. REESE, and Dr. THOS. O. EDWARDS, of Iowa, was called to the chair.

After some time had been spent therein, the Committee of the Whole rose, and through their Chairman reported to the Association that the Committee had had the apology of Dr. D. MEREDITH REESE, of New York, which had been referred to them, under consideration, and had arrived at the following conclusion thereon; that it was considered "ample, full, complete and satisfactory."

On motion, this report was received and adopted.

Dr. LAMB moved that the apology of Dr. REESE be amended by

the insertion of the word "regret." After some debate upon this motion,

Dr. REESE submitted the following statement:—

"The undersigned regrets that he certified to the professional qualifications for Blockley Hospital, Philadelphia, of an expelled member of this body, and hereby offers this apology for his departure from the ethical code.

(Signed) D. M. REESE."

On motion, this apology was accepted as satisfactory.

Dr. BRYAN, of Pennsylvania, then offered the same, as the language of his apology, which was accepted by the Association, upon a motion to that effect.

The President announced that the Faculty of Georgetown College had invited the Association to an entertainment at the College this afternoon, and that omnibuses would leave the principal hotels at 5 o'clock, to convey the members thither.

On motion, the invitation was accepted, and the thanks of the Association tendered to the President and Faculty of the College.

The President apprised the Association that the Pennsylvania Railroad Company, the Wilmington and Manchester (N. C.) Railroad Company, the Illinois Central Railroad Company, the Northeastern Railroad Company of South Carolina, and the Richmond and Petersburg Railroad Company, had kindly consented to pass members on their return home, free, over their respective roads, upon the exhibition of cards of membership.

On motion, the Association adjourned.

THIRD DAY. THURSDAY, *May* 6, 1858.

The President called the Association to order at 9 o'clock. The reading of the minutes of yesterday was temporarily postponed.

The following resolution, offered by Dr. R. C. FOSTER, of Tennessee, was adopted:—

Resolved, That all reports from committees on Epidemics, and Medical Topography, be referred to the Committee on Publication, and all communications from special committees, be referred to the Committee on Nominations.

Dr. PAUL F. EVE, of Tennessee, moved that a committee on Voluntary Essays be appointed; which motion was carried. He also stated that Dr. GEO. HAYWOOD, of Massachusetts, had been appointed a delegate to represent this Association in kindred societies in Europe.

An invitation was received and accepted, from Commander M. F. MAURY, United States Navy, superintendent of the National Observatory, inviting the Association to visit that establishment.

Dr. FRANK H. HAMILTON, of New York, from the Committee of Delegates from Medical Colleges, to whom were referred the resolutions reported by the Special Committee on Medical Education, submitted the following report:—

"The Committee to whom were referred the resolutions appended to the report of the Special Committee on Medical Education, have adopted the following preamble and resolution:—

"Fully appreciating the value and importance of the resolution under which we have been appointed, but a majority of the gentlemen constituting this committee not being authorized by the medical faculties of the several colleges with which we are connected to act as their representatives in this matter, and moreover regarding it as quite impossible to secure a convention of delegates in the interim of the meetings of this Association: therefore—

"*Resolved*, That we recommend to all the Medical Colleges entitled to a representation in this body, that they appoint delegates, especially instructed to represent them in a meeting to be held at Louisville, on Monday, the day immediately preceding the convention of the American Medical Association for the year 1859, at ten o'clock in the morning, at such place as the Committee of Arrangements shall designate.

S. D. GROSS, *Chairman*,
FRANK H. HAMILTON, *Secretary*."

This report was accepted on motion of Dr. KEMP, of Maryland, and the preamble and resolution were adopted; and the Committee was instructed to meet in Louisville on the Monday preceding the session of 1859.

Reports from Special Committees for 1858 being now in order, (the reports of committees on Medical Topography and Epidemics having previously been referred to the Committee on Publication without reading), Dr. J. FOSTER JENKINS, of New York, Chairman of the Committee on "Spontaneous Umbilical Hemorrhage of the Newly Born," presented his report, which was accepted and referred to the Committee on Publication.

Dr. S. M. BEMISS, of Kentucky, Chairman of the Committee on "Influence of Marriages of Consanguinity upon Offspring," read his report, which was accepted, and referred to same committee.

Dr. ATLEE, of Pennsylvania, from the Committee on the subject of preparing a stone for the Washington National Monument, presented the following report, which, with the accompanying resolution, was accepted and referred to the Committee on Publication:—

The Committee appointed at the meeting of the American Medical Association at Richmond, in May, 1852, to solicit subscriptions from members for the purpose of procuring a suitable stone, with an appropriate inscription, for insertion, in the name of the Association, into the National Monument to the memory of Washington, now in progress of erection at Washington City, respectfully report

That immediately after the adjournment of the Association the issued a circular, addressed to every member then on the list. I addition to which, an appeal to the members was personally mad by the Chairman, at several subsequent meetings of the Associatio without obtaining an amount sufficient to defray the estimated e pense, viz., one thousand dollars.

Confiding, however, in the determination of the Association effect the object of the resolution, the Committee took measures have the stone prepared. Mr. Lewis Hally, a marble mason of city of Lancaster, Pennsylvania, had in his employment a yo man, Mr. I. Augustus Beck, a native of Litiz, Pennsylvania, had given unmistakable evidence of genius as a sculptor. the suggestion of the late lamented Dr. A. L. Pierson, of Sa Massachusetts, made at the meeting in New York, just two before his untimely death at Norwalk, the design of the celeb painting of Girodel Trioson, representing Hippocrates refusin presents of the Persian King, Artaxerxes, and his invitati leave Greece, and reside and practise among her enemies selected.

A block of Vermont marble was procured, and the work ex by Mr. Beck, under many disadvantages; but to the entire s tion of the Committee, and it is hoped, of the Association, w now have another opportunity of seeing it at the lapidariu the monument. The motto carved upon the stone is "Vinci Patriæ," with the name of the Association and date of its tion.

At the meeting of the Association, in Philadelphia, in 1 stone was exhibited, and the amount contributed by the n individually, being but $501 30; it was, on motion of Dr. Jo son, of New York, unanimously resolved: That one dollars be appropriated to defray the expenses incurre Committee, and that the balance beyond the money al lected, be drawn from the funds in the treasury of the A by the Chairman.

Accordingly, the Chairman of the Committee receive Caspar Wister, Treasurer of the Association, June 11, 18

for $498 70, the amount necessary to make up the sum of $1,000. Of this, the sum of five hundred dollars was paid to the young artist, then in Europe, and the balance, after defraying all other expenses, was paid to Mr. Haldy, the contractor for the work.

Owing to the very insecure state of the building, in which the stones contributed by the various States and Societies to the monument were then kept, the transmission of the stone was delayed, at the request of the Secretary of the Washington National Monument Society, until a more suitable receptacle was constructed. It was then forwarded, under the care of Mr. Haldy, to Washington, in a car especially appropriated for the purpose, by the Northern Central Railroad Company, and the Baltimore and Ohio Company, who generously refused all compensation.

A letter expressive of the sentiments of the Association in presenting the stone, was addressed to the President of the National Monument Society, to which the following reply was received:—

OFFICE WASHINGTON NATIONAL MONUMENT SOCIETY,
September 12th, 1856.

JNO. L. ATLEE, M. D.,
Chairman, &c.,

SIR: Your letter of the 8th inst., directed to the President of the Washington National Monument Society, was duly presented by Mr. Haldy, by whom also the block therein referred to was to-day safely delivered, and it now stands in the lapidarium at the foot of the monument.

This tribute from the American Medical Association, of love and veneration for the character of Washington, is as appropriate as it is beautiful. The native artist by whom it was executed, must have been deeply impressed with his exalted theme; for he has admirably succeeded in portraying the most glorious event perhaps in the life of the Father of Medicine. No profession than your own is more justly entitled to a niche in the Temple dedicated to the greatest and best citizen that ever lived. The fall upon Bunker Hill, of the accomplished Warren, and the signature of the celebrated Rush to the Declaration of Independence, in the earliest period of our Revolutionary struggle, brilliantly illustrate how naturally the spirit of their private duties prepared and prompted them to devote "their lives, their fortunes, and their sacred honor" to the promotion of their country's welfare. That the patriotic philanthropy which glowed in the bosom of Hippocrates has been transmitted, unchilled by the lapse of ages, and still actuates his disciples, has been further manifested, in the generous sacrifices made by so many members of your Association during the late epidemics in Norfolk and New Orleans; and gives the assurance that the motto on your sculptured block, *Amor Vincit Patriæ*, will be forever appropriately descriptive of your magnanimous profession. Devoutly reciprocating your solicitude for the integrity and

perpetuity of our sacred Union, I have the honor to subscribe myself, on behalf, and by order of the Board, very respectfully,

SAMUEL YORKE ATLEE,
Secretary Washington National Monument Society.

The Committee, in conclusion, respectfully recommend the adoption of the following resolutions:—

Resolved, That the thanks of the American Medical Association be presented to the Northern Central Railroad Company, and to the Baltimore and Ohio Railroad Company, for their liberality in conveying the Monument Stone, from Lancaster to Washington free of charge.

Resolved, That the Secretary of this Association transmit to the Presidents of said roads, respectively, a copy of the above resolution

Dr. E. ANDREWS, of Illinois, Chairman of the Committee "Functions of different portions of the Cerebellum," offer through Dr. A. B. PALMER, of Michigan, an abstract of his rep which was read, and referred to the same Committee.

Dr. H. FRASER CAMPBELL, of Georgia, Chairman of the C mittee on "the Nervous Concomitants in Febrile Diseases," re report, which was accepted and referred to the same Committe

Dr. J. MARION SIMS, of New York, Chairman of the Comm on "Treatment of the Results of Obstructed Labor," read a re which was accepted and referred to the same Committee.

Dr. MARK STEPHENSON, of New York, Chairman of the mittee on the "Treatment best adapted to each variety of Ca with the method of operation, place of election, time, age, &c., an abstract of his report, which was accepted and referred Committee on Publication.

Dr. C. B. COVENTRY, of New York, Chairman of the Con on the "Medical Jurisprudence of Insanity, and the Testin Skilled Witnesses in the Courts of Justice," communicated port, which was accepted and referred to the Committee on cation.

Committee on Etiology and Pathology of Epidemic Ch W. GORDON, of Ohio, Chairman, continued under the rule.

Dr. EDWARDS, of Iowa, from the Committee on Non presented the following report for Special Committees for

Special Committee on the Microscope.—Drs. JOHN G. F. Zanesville Ohio; JOHN C. DALTON, Jr., of New Yorl HUTCHINSON, of Mooresville, Indiana; A. R. STOUT, San California; CALVIN ELLIS, Boston, Massachusetts.

Special Committee on Medical Jurisprudence.—Drs. STEPHEN SMITH, New York City; FRANK H. HAMILTON, Buffalo, New York; DIXI CROSBY, Hanover, New Hampshire; S. S. PURPLE, New York City; ISAAC S. MULFORD, Camden, New Jersey.

Committee on Quarantine.—Drs. ELISHA HARRIS, New York; J. M. MORIARTY, Boston, Massachusetts; R. LA ROCHE, of Pennsylvania; W. T. WRAGG, of Charleston, South Carolina; E. D. FENNER, New Orleans, Louisiana.

Committee on Surgical Pathology.—Dr. JAMES R. WOOD, New York.

Diseases and Mortality of Boarding Schools.—Dr. C. P. MATTINGLY, Kentucky.

On the Various Surgical Operations for the Relief of Defective Vision.—Drs. MONTROSE A. PALLEN, St. Louis, Mo.; T. J. COGLEY, of Madison, Indiana.

Milk Sickness.—Dr. EDWARD MURPHY, of New Harmony, Indiana.

On the Blood Corpuscle.—Dr. A. SAGER, Ann Arbor, Michigan.

On Medical Ethics.—Drs. JOHN WATSON, New York; JOHN C. DALTON, Lowell, Massachusetts; G. EMERSON, Philadelphia, Pennsylvania; FRANK H. HAMILTON, Buffalo, New York; P. C. GAILLARD, Charleston, South Carolina.

On the Pons Varolii, Medulla Oblongata, and Spinal Marrow; their Pathology and Therapeutics.—Dr. S. B. RICHARDSON, Louisville, Kentucky.

On American Medical Necrology.—Dr. C. C. COX, Easton, Maryland.

On the Hygienic relations of Air, Food and Water, the natural and artificial causes of their impurity, and the best methods by which they can be made most effectually to contribute to the public health.—Dr. C. C. COX, Easton, Maryland.

On the Effect of Virus of Rattlesnake, &c., when introduced into the System of the Mammalia.—Dr. A. S. PAYNE, Paris, Fauquier County, Virginia.

On the Climate of the Pacific Coast, and its Modifying Influences upon Inflammatory Action and Diseases generally.—Dr. O. HARVEY, Placerville, California.

The Constitutional Origin of Local Diseases; and the Local Origin of Constitutional Diseases.—Dr. C. F. HEYWOOD, New York.

The Physiological Effects of the Hydro-Carbons.—Dr. F. W. WHITE, Chicago, Illinois.

Special Committee on Epilepsy.—Drs. JOHN G. KYLE, Ohio, Chairman; JNO. G. F. HOLSTON, Zanesville, Ohio; D. COOPER AYRES, Green Bay, Wisconsin; H. J. DUNAHOE, Sandusky, Ohio; CALVIN WEST, Indiana.

Causes of the Impulse of the Heart, and the Agencies which influence it in Health and Disease.—Dr. J. W. CORSON, of New York City.

Best Substitutes for Cinchona and its Preparations in the Treatment of Intermittent Fever, &c.—Dr. B. S. WOODWORTH, of Fort Wayne, Indiana.

Special Committee on Government Meteorological Reports.—Drs PAUL F. EVE, of Tennessee; ZINA PITCHER, of Michigan; R. E COOLIDGE, United States Army; THOS. MILLER, D.C.

To fill vacancies in the Committee on Medical Topography and Ep demics; and continuations of the Committees.—JAMES C. WESTO M.D., of Bangor, Maine; ALBERT SMITH, M.D., of Peterborou New Hampshire; J. PERKINS, M.D., of Castleton, Vermont; JAM H. DICKSON, M.D., of Wilmington, North Carolina; PETER C. GA LARD, M.D., of Charleston, South Carolina; THOS. M. LOGAN, M. of Sacramento, California; J. H. BEECH, M.D., of Cold Wa Michigan; CHARLES HOOKER, M.D., of New Haven, Connectic

Dr. EDWARDS also reported from the Committee on Nomina the following resolution:—

Resolved, That a committee of nine be appointed by the C to wait on the Hon. HOWELL COBB, Secretary of the Treasury respectfully to request the restoration of Dr. M. J. BAILEY, spector of Drugs and Medicines for the port of New York.

This report was, on motion, accepted and adopted.

On motion of Dr. G. TYLER, of D.C., the vote, by whi whole report was adopted, was reconsidered, and the repo divided; and that portion of the report which referred to n tions for committees was adopted.

Dr. BOLTON, of Virginia, then moved the adoption of the tion accompanying the report of the Committee.

Dr. C. C. COX, of Maryland, offered the following resolut substitute:—

Resolved, That the appointment of Inspectors of Drugs a cines in the various ports of the United States should, in ion of this Association, have regard to the essential, m scientific qualifications of the candidates, and not to consi of personal favoritism or political bias.

Dr. PARKER, of Virginia, offered two other resolutions, stitute, which were not agreed to.

The question recurring on the adoption of the substitute offered by Dr. COX, it was not agreed to.

Dr. WILCOX, of Connecticut, then moved an amendment to the resolution, by adding the words "disclaiming all political considerations," which amendment Dr. EDWARDS accepted.

After some discussion, Dr. RODGERS, of New York, moved to lay the resolution on the table.

The previous question was demanded and sustained.

The motion to lay on the table was lost—yeas 49, nays 64; and the resolution offered by Dr. EDWARDS from the Committee on Nominations was adopted with the amendment, by a vote of yeas 79, nays 52, and reads as follows:—

Resolved, That a committee of nine be appointed by the Chair to wait on the Hon. HOWELL COBB, Secretary of the Treasury, and respectfully to request the restoration of Dr. M. J. BAILEY as inspector of drugs and medicines for the port of New York—at the same time disclaiming all political considerations.

Dr. BOHRER, of D. C., from the Committee on Voluntary Essays, reported a want of sufficient time for their examination, and prayed their reference to the Committee on Publication. This was adopted, with an amendment by Dr. CONDIE that only such papers should be referred to the latter Committee as the former might read and deem fit for publication.

The President announced, as a special committee under Dr. EDWARDS' resolution, Drs. ARNOLD, of Georgia; ATKINSON, of Virginia; BULKLEY, of New York; HAYS, of Pennsylvania; SMITH, of New Jersey; MCPHEETERS, of Missouri; HARGRAVES, of Alabama; PITCHER, of Michigan; and HOOKER, of Connecticut.

On motion, Dr. EDWARDS was added to the Committee as Chairman.

Dr. GRANT, of New Jersey, presented a complaint made by the Newark Medical Society against the New York Medical College, for a violation of the ethics of the profession. Dr. EDWARDS, of Iowa, presented a similar complaint, and Dr. OAKLEY, of New Jersey, a complaint from the Union and Essex County Medical Societies. They were received and referred to the Committee on Ethics.

A communication received from Dr. E. D. FENNER, of Louisiana, was, on motion, referred to the Committee on Publication.

Dr. W. L. SUTTON offered the following resolution:—

Resolved, That a committee of three, physicians of the District of Columbia, be appointed, whose duty it shall be to wait upon the

Census Bureau and impress upon the proper officer the great interest which this Association feels in the proper collection of the details contemplated by the laws for taking the census of 1860; and especially that portion which relates to vital statistics; and to urge the importance of securing, at an early day, the services of a physicia versed in vital statistics, to assist in constructing the schedules, an in superintending this branch of the census.

This resolution was adopted, and the following gentlemen we appointed as the Committee: Drs. THOMAS MILLER, THOMAS AN SELL, and A. Y. P. GARNETT, all of D. C.

Dr. W. L. SUTTON, of Kentucky, also offered the following re lution:—

Resolved, That a committee of five be appointed, whose dut shall be to prepare a plan for an uniform system of registratio births, marriages, and deaths; including the nomenclature classification of causes of death, to be recommended to the se States for adoption. And that the report by Dr. JARVIS, of M to this meeting, be submitted to them, during the remainder o session.

This resolution was also adopted, and the following gentl appointed as the Committee, viz: Drs. W. L. SUTTON, Kent EDWARD JARVIS, Massachusetts; EDWARD M. SNOW, Rhode I WILSON JEWELL, Pennsylvania; R. W. GIBBES, South Caro

Dr. KYLE, of Ohio, offered the following resolution, whi laid over till the next meeting under the rules:—

Resolved, That the Constitution of this Association be so a as to prohibit the admission as a delegate, or the recogniti member, of any person who is not a graduate of some res Medical College.

Dr. L. A. SMITH presented the following resolutions of Jersey Medical Society, praying for such changes of the tion as would establish a Board of Censors in every judici of the Supreme Court, who should examine and grant di all proper members of this Association:—

Whereas, The physicians of New Jersey early evinced th ciation of the value of associated effort in elevating the and supporting the dignity of the medical profession, by the Medical Society of New Jersey on the 23d of July, 176 which organization much has been done to promote g among the members of the profession, and to encourage a of qualifications in those who have desired to practise m surgery in this State, thus guarding the health and l

citizens against the ignorance and presumption of pretenders to the healing art; and

Whereas, The Medical Society of New Jersey, cherishing an abiding interest in all that relates to the honor and dignity of the profession of our whole country, took part in organizing the American Medical Association, still regard that organization with confidence and favor, and believe that it possesses the elements of a power, which, if exerted in the right direction, will result in great good to the profession, and through it to the public; and

Whereas, This society is anxious that the qualifications for membership in that body shall be such as will tend to elevate the profession above all merely local influences, thus giving a character and influence to its members that can be attained by no other means within the exclusive control of the profession of this country; therefore,

Resolved, That the Medical Society of New Jersey would respectfully recommend to the American Medical Association, the adoption of some plan by which membership in that body can only be attained by conforming to certain rules and regulations laid down in the Constitution of the Association.

To this end, this society would respectfully recommend that the "Plan of Organization" of the Association be amended in some such manner as the following—subject to the deliberations of the Association:—

Delegates to the American Medical Association shall be selected from those who shall conform to the requirements of the Association for membership in that body.

The title, *Member of the American Medical Association* ("M.A.M.A.") shall be conferred in the manner following, to wit:—

The Association shall appoint a Board of Censors for each circuit of the United States Supreme Court, each Board to consist of ——— physicians and surgeons in good standing in the Association, one of whom shall go out of office at each annual meeting of the Association, his place being filled by election, until the places of all the original members are so supplied, and thus continually. These censors shall reside in different sections of their respective districts, and a minority of the whole number of any Board of Censors may be composed of professors in medical colleges in the district. The members of the Boards of Censors to receive —— dollars compensation for every meeting they attend.

It shall be the duty of these Boards of Censors to meet —— times a year in different sections of their respective districts, for the purpose of examining candidates for the title of "Member of the American Medical Association," on whose certificate the President, or other authorized officer or officers of the Association, shall, after the candidate has subscribed to the Code of Ethics of the Association, and paid —— dollars into its treasury, issue a diploma, setting forth the fact of membership.

The certificates of the medical and surgical examining boards of

the U. S. Army or Navy shall entitle the holder to membership in the Association, on the holder subscribing to the Code of Ethics, and paying the usual fee. Members may also be received, within certain specified limits, on certificate from foreign medical and surgical societies, or examining boards.

The Association may confer honorary membership at any regular meeting by a two-thirds vote.

Resolved, That in the opinion of the Medical Society of New Jersey, the cause of medical science in the United States would be advanced by the State societies resolving themselves into *auxiliaries* to the National Association, the district, county, and other societies being auxiliary to the State societies, and all controlled by the regulations of the National Association.

Resolved, That the delegates from this society be instructed t present the above preamble and resolution at the meeting of th American Medical Association, to be held in Washington City May next.

All which is respectfully submitted.

L. A. SMITH,
JOHN BLANE,
S. W. BUTLER,
J. V. SCHENCK,
J. H. CLARKE.

TRENTON, N. J., *January* 27, 1858.

Laid over for one year, under the rules.

On motion of Dr. L. HUMPHREYS, of Indiana, the following amble, resolution, and circular, were ordered to be incorporat the *Transactions* of the Association, viz:—

Whereas, A circular looking to the interchange of the pub *Transactions* of the various local medical societies of the U States, was unanimously recommended at the last meeting Indiana State Medical Society (a copy of which, as prepa their Committee, is hereto annexed); and whereas, it is in the of this Association to promote and successfully carry out th thereof; therefore,

Resolved, That we cordially approve of a general interch published *Transactions* between the various local societie United States, and that, to carry out this desirable object, gates of the various societies which publish their *Trans* requested to leave the names and post-office address of t tary thereof with the Secretary of this Association, wh be published with its proceedings, and each society is h commended to send by mail, prepaid, *three copies* of their *Transactions* to all of the other societies included in such

The Indiana State Medical Society, at its last annual meeting, adopted the following resolution, viz:—

Resolved, That the President appoint a committee of three to prepare and present to this Society, at its next meeting, a plan for an interchange of published *Transactions* of local societies within the United States; that said Committee be authorized and empowered to correspond with the officers of any local society as above stated, and to take such steps generally as may be necessary to accomplish the objects for which this Committee is appointed.

The undersigned were appointed said Committee. Will you have the goodness to bring this subject to the attention of your Society at its next meeting; ask some definite action, and communicate early the result to this Committee?

The benefits of such an interchange of publications as contemplated by our Society are numerous and important, as must be obvious to every reflecting mind. We can but barely mention a few of them:—

First, The more general diffusion among our scattered and measurably isolated professional fraternity, of the records of facts, observations and opinions, in a profession abounding, above all others, in them, on a great variety of subjects, and in which, too often, a *few* facts found on record, or observed, are allowed to give direction to conservative or curative efforts of the first importance.

Second, The cultivation of a better acquaintance with professional brethren throughout the country, by means of the minutes of the meetings of societies, and the papers read before and discussed in them, in a profession affording otherwise but limited opportunities for the formation of such an acquaintance, and therefore needing the more vigorous use of such as are possessed.

Third, The stimulus such an arrangement will afford to the diligent cultivator of the profession, to observe well, to record accurately, speculate philosophically, reason logically, practise usefully, and write perspicuously.

Fourth, The probable large increase in the number of writers in the profession, and the consequent elevation of the standard of qualification for entering it.

Fifth, The cultivation of an enlarged and liberal *esprit du corps*, by being brought into contact with the mass of the professional minds of the country.

The Committee solicit suggestions as to the details of a plan for the attainment of this desirable object. They are sensible of many considerable difficulties in the way of it, mainly from want of some channel of intercommunication common to all. Possibly the American Medical Association might become this common channel, and thereby increase its influence.

The *Transactions* might be made the nucleus of a library, where one does not exist in any State or local society, and be used by

its members under library regulations. Please acknowledge the receipt of this Circular, and communicate at as early a period as possible, the action of your Society upon this subject. Hoping to hear that your Society concurs in this movement,

Respectfully yours,

L. HUMPHREYS,
CHAS. FISHBACK,
R. H. BUCK,
Committee.

Address, Dr. L. Humphreys (Chairman of the Committee), South Bend, St. Joseph County, Indiana.

P. S.—Our Society meets annually in May.

On motion of Dr. R. W. GIBBES, of South Carolina, it was—

Resolved, That Prof. G. C. SWALLOW, of Missouri, and Prof. J. F. MITTAG, of South Carolina, be members by invitation of this Association.

On proposition from the Committee of Arrangements, Dr. A. R. BLAIR, of York, Pennsylvania, and Dr. JOHN H. GIBBON, of United States Mint, North Carolina, were admitted members by invitation.

On motion of Dr. H. FRASER CAMPBELL, of Georgia, it was—

Resolved, That this Association has learned with deep regret of the death of the following permanent members of this body: MARSHALL HALL, England; C. R. WALTON, Georgia; S. W. CLANTON, Alabama; W. G. CRAGHEAD, Virginia; JOHN K. DOWNES, Connecticut; NATHAN S. PIKE, Connecticut; W. W. MORRIS, Delaware; and WILLIAM GRIES, Pennsylvania.

Dr. R. W. GIBBES moved that Prof. JOSEPH HENRY, of the Smithsonian Institution, be requested to favor this Association with his views on Meteorology, at such time during the session as he may select; which was agreed to.

An invitation from Prof. BACHE to visit the Coast Survey Bureau, on Capitol Hill, was read, accepted, and a vote of thanks for the courtesy was passed.

On motion of Dr. PHELPS, the following resolutions were passed unanimously:—

Resolved, That the thanks of this Association are eminently due to the Regents and Prof. HENRY, of the Smithsonian Institution, for the ample and convenient accommodations afforded for the transaction of business.

Resolved, That the Committee of Arrangements are entitled to our praise and highest appreciation of their exertions to promote

the comfort of the members and the best interests of the Association.

Resolved, That to the physicians of Washington and Georgetown, and the Faculty of Georgetown College, we accord the homage of our sincerest thanks for their elegant hospitalities extended to the members from abroad, by which the pleasure of their sojourn here has been so greatly enhanced.

Resolved, That we feel assured that the impressions on the tablet of memory received here, in our national metropolis, in this the first year of the second decade of the Association, will long remain an evidence of the urbane attentions received not only from the Chief Magistrate and other public functionaries of our glorious Union, but of private citizens and the community at large.

Resolved, That the manifestations of union of heart and purpose in the action of this session inaugurate a new era, and call for devout acknowledgment to Divine Providence, and presage, as we trust, not only a bright future for the Association, but also as contributing to the perpetuity and prosperity of our great national confederation.

On motion of Dr. FOSTER, of Tennessee, it was—

Resolved, That, after 1860, Dr. HAMILTON have the privilege of using his report on "Deformities after Fracture," published in the *Transactions*, for a work which he proposes to publish, or in such manner as he shall see fit.

Dr. H. FRASER CAMPBELL, of Georgia, was, on motion, granted the same permission in relation to his reports to the Association.

On motion, Dr. ARNOLD, of Georgia, described a new and effective method of preserving pathological specimens, and exhibited several interesting preparations.

On motion of Dr. CONDIE, of Pennsylvania, the Association heard Dr. GASTON, of South Carolina, in explanation of his new Uterine Supporter.

On motion of Dr. L. A. SMITH, of New Jersey, Dr. PETER PARKER, ex-commissioner to China, was then introduced. He exhibited some curious specimens of calculi, as the results of thirty-eight operations upon Chinese. They were of various shapes and composition, and weighed from a few drachms up to three, seven, and eight ounces.

On motion of Dr. MILLER, of District of Columbia, it was—

Resolved, That the Committee on Publication cause two copies of the *Transactions* of the Association to be transmitted to the

British Association, through the British legation at Washington, with a request for an interchange of *Transactions.*

Dr. DUNBAR, of Maryland, then offered the following resolution, which was adopted:—

Resolved, That the thanks of the American Medical Association are due to Dr. PETER PARKER, for the very interesting report that he has made of his surgical operations in China, and his specimens which he has exhibited; and when his work shall be published, that the members of this Association be recommended to patronize the same, by obtaining copies thereof.

It was ordered, upon motion, that when this Association adjourn, it be to meet again at 5 o'clock this afternoon.

Dr. DUNBAR moved a reconsideration of the vote by which the resolution reported by the Committee on Nominations, asking the restoration of Dr. BAILEY to the post of Inspector of Drugs, for the city of New York, was adopted.

After discussion, the previous question was demanded and sustained; and under its operation a division was had, and the motion to reconsider prevailed. Yeas 51, nays 32.

On motion of Dr. MCNULTY, of New York, the whole subject was indefinitely postponed.

On motion of Dr. ANDERSON, of New York, it was unanimously

Resolved, That the thanks of the Medical Association be presented to Rev. Dr. MCGUIRE and the Faculty of the College of Georgetown, for their very cordial reception and entertainment of the Association at the College.

The Association then, on motion, adjourned until 5 o'clock P. M.

EVENING SESSION—THURSDAY, *May* 6, 1858, 5 P. M.

The Association assembled at 5 o'clock P. M. Dr. W. L. SUTTON, one of the Vice-Presidents, in the chair.

Dr. T. L. MASON, of New York, moved to amend the Constitution as follows:—

In first line, second paragraph of Article 2, after the words "shall receive the appointment from," to insert "any medical society *permanently* organized in accordance with the laws regulating the practice of physic and surgery in the State in which they are situated; and consisting of physicians and surgeons regularly authorized to practise their profession." Laid over to next year, under the rules. To add to the sixth paragraph, Article 2, "But each permanent member of the first class designated in this plan

of organization, shall be entitled to a seat in this Association only on his presenting to this body a certificate of his good standing, signed by the Secretary of the Society to which he may belong at the time of each annual meeting of this body." Laid over to next year, under the rules.

Dr. HENRY HARTSHORNE, of Pennsylvania, moved the following amendment to the Constitution, which was also laid over, viz:—

To add to the 2d Article: "No one expelled from this Association shall at any time thereafter be received as delegate or member, unless by a three-fourths vote of the members present at the meeting to which he is sent, or at which he is proposed."

The amendments which were proposed at the last annual meeting at Nashville, were then considered *seriatim*, upon motion to that effect. They were read as follows:—

1st. Amend the 3d Article of the Constitution, in relation to meetings, by inserting after the words "first Tuesday in May," the words "or the first Tuesday in June;" and also inserting after the words "shall be determined," the words "with the time of meeting."

2d. In Article 2, omit the words "medical colleges," and also the words "the Faculty of every regular constituted medical college, or chartered school of medicine, shall have the privilege of sending two delegates."

After some discussion, both the proposed amendments were rejected, two-thirds not voting in favor thereof.

Dr. JOHN WATSON, of New York, from the Committee on Ethics, reported as follows:—

Whereas, It appears from undoubted testimony that the New York Medical College have conferred the degree of Doctor of Medicine upon a notorious quack of the name of John F. Dunker, of Newark: The Faculty, in the person of the President of said College, wish here to declare that this degree was obtained under gross deception, and false testimonials furnished by said Dunker and his friends, and they therefore revoke and annul his diploma, and declare said Dunker to be unworthy of patronage or support, from authority conferred upon him by this diploma.

Dr. C. C. COX, of Maryland, moved that the report be indefinitely postponed, which was not agreed to.

On motion, the report was then adopted.

The amendments proposed by Dr. STOCKER, of Pennsylvania, at the annual meeting in 1856, at Detroit, were then taken from the table for consideration, upon motion.

The following were the amendments proposed, viz:—

Article 3. Strike out all after the words "first Tuesday in May," and insert as follows: "The Association shall meet biennially in the city of ———. The place of meeting for the intermediate year shall be determined by a vote of the Association."

Article 4. In first paragraph, second line, instead of the words "two Secretaries," insert "one permanent, and two assistant Secretaries." In fourth paragraph, fifth line, strike out the words "the Secretary," &c., and substitute: "The *permanent* Secretary shall preserve the archives, and unpublished transactions in the permanent place of meeting of the Association. His expenses for travelling to and from the place of meeting, and while in attendance upon the same, shall be defrayed by the Association."

Upon the amendment proposed to Article 3, the vote was—yeas 80, nays 42. And upon the first amendment proposed to Article 4, the vote was—yeas 84, nays 53. Neither of the amendments having received the constitutional majority of two-thirds, the President declared them to be rejected.

A motion was made to postpone indefinitely the second amendment proposed to Article 4.

Dr. STOCKER moved to lay the motion to postpone upon the table.

Pending this, a motion was made to lay the amendment upon the table, which was agreed to.

Dr. ROBT. C. FOSTER, of Tennessee, offered the following resolution, which was adopted, viz:—

Resolved, That the Committee on Publication be instructed to collect all the by-laws and resolutions which have not been rescinded through the different volumes of the *Transactions;* to arrange them under their respective heads, and append the same to the Constitution.

The following amendment to the Constitution was proposed by Dr. J. BERRIEN LINDSLEY, of Tennessee, through Dr. BOWLING, of Tennessee, and was laid over, under the rules, viz:—

"In Article 2, omit the words 'medical colleges, hospitals, lunatic asylums, and other permanently organized medical institutions of good standing in the United States;' and also to omit the words: 'The Faculty of every regular constituted medical college or chartered school of medicine shall have the privilege of sending two delegates. The professional staff of every chartered or municipal hospital containing an hundred inmates or more shall have the

privilege of sending two delegates, and every other permanently organized medical institution of good standing shall have the privilege of sending one delegate.'"

The President announced that the members of the Association were invited by the Curator of the Washington Infirmary to visit that institution.

Upon motion of Dr. KEMP, of Maryland, the thanks of the Association were extended to those railroad companies which had agreed to pass the members to their homes free of charge; and also to all those citizens of Washington, including members of the press, whose courteous attentions had placed the Association under obligations.

On motion, the Association adjourned *sine die.*

A. J. SEMMES, } *Secretaries.*
S. M. BEMISS, }

REPORT

OF

THE COMMITTEE OF PUBLICATION

AND OF

THE TREASURER.

REPORT OF THE COMMITTEE OF PUBLICATION.

THE Committee of Publication respectfully report:—

That immediately on the receipt of the proceedings of the last meeting of the Association, at Nashville, Vol. X. of the *Transactions* was put to press, and copies were distributed to the members early in November. Eight hundred copies of that volume were printed. Of these four hundred and fifty-one have been disposed of to members, subscribers, and medical journals.

The aggregate expense of paper, printing, illustration and binding, was $1374 73. The various items will be found in the report of the Treasurer.

The distribution of the volume, as in former years, was effected by express and by mail; in the latter case the recipients bore the expense of postage.

The following gentlemen have rendered essential service to the Association in procuring subscribers to and distributing Vol. X. Drs. E. L. BEADLE, of N. Y.; CHARLES HOOKER, of New Haven; J. N. BORLAND, of Boston; D. C. ENOS, of Brooklyn, L. I.; ALDEN MARCH, of Albany, N. Y.; H. F. ASKEW, of Del.; H. W. DE SAUSSURE, of Charleston; J. B. LINDSLEY, of Nashville; F. H. HAMILTON, of Buffalo, N. Y.; WM. BRODIE, of Detroit, Michigan; J. L. ATLEE, of Pennsylvania; and D. L. MCGUGIN, of Keokuk, Iowa; to all of whom the Committee desire to express their grateful acknowledgments for the efficient aid they have rendered.

They desire also to record their obligations to Messrs. Blanchard & Lea, of Philadelphia, who generously put at their disposal whatever illustrations in their collection the Committee required, thus saving the Association considerable outlay.

The Committee desire to impress upon the individual members of the Association, that in order to secure a complete and accurate list of permanent members, it is necessary to notify the Chairman before the first of August, of any changes of residence, deaths, or

typographical errors, that may come under their notice. By this means past errors may be corrected and future ones avoided.

Since the last meeting a full and accurate account of the stock of the Association has been taken, and the following schedule exhibits the number of copies of each volume of the *Transactions* now in their possession:—

Vol. I. On hand at this date	32	copies.
Vol. II. " " "	5	"
Vol. III. " " "	15	"
Vol. IV. " " "	6	"
Vol. V. " " "	309	"
Vol. VI. " " "	68	"
Vol. VII. " " "	206	"
Vol. VIII. " " "	265	"
Vol. IX. " " "	378	"
Vol. X. " " "	249	"
Proceedings of the first meeting at New York	46	"

All of which is respectfully submitted.

FRANCIS G. SMITH, JR., *Ch'n.*
H. F. ASKEW,
S. L. HOLLINGSWORTH,
S. LEWIS,
C. WISTER.

REPORT OF THE TREASURER.

THE Treasurer respectfully reports:—

That as the last annual meeting of this Association was limited in numbers, the receipts of the Treasury were proportionably less than on similar occasions previously, it was therefore thought expedient, upon the publication of the *Transactions*, to send a circular to each permanent member of the Association, announcing the readiness of the volume, and offering it for sale. The response was liberal, particularly when the financial difficulties of the period are recalled, and thus the expenses of the Committee of Publication were duly met.

As a large amount of property belongs to the Association, consisting mostly of back numbers of the *Transactions* and engraved blocks, it was thought judicious to provide against loss by fire; a risk to which this description of property was of necessity much exposed. Under the general powers of the Treasurer, as custodian of the property, an insurance was effected, without awaiting action by the Association. This large accumulation of back numbers of the *Transactions* amounts to some sixteen hundred volumes, and, owing chiefly to there being no full set for sale, the editions of volumes two and four being exhausted, is subject to very limited demand.

As there is therein locked up a considerable amount of unavailable capital, decreasing yearly in value, and also a fund of important medical information, which it is one of the objects of this Association to disseminate throughout the profession, the following resolutions are respectfully submitted:—

Resolved, That on or after each annual meeting, the back volumes of *Transactions* for sale by the Association, shall be sold at two dollars apiece to permanent members, except the volume published the preceding year—this to continue at the price paid for it by delegates until the next annual meeting; and also,

Resolved, That as volumes V., VII., VIII. and IX., are in great excess, these four collectively may be had by any permanent member who shall remit $5 to the Treasurer; and the Treasurer is empowered to make such publication of these resolutions as he may think necessary.

CASPAR WISTER.

The American Medical Association

DR.

April 15, 1858.	
To cash received from Dr. Caspar Wister, Treasurer, being balance on hand, April 15, 1857 . . .	$819 01
To cash received from delegates, and for sale of *Transactions*, Nashville, Tenn.	659 00
To cash received from Dr. A. B. Palmer, for sale of *Transactions*, Chicago, Ill.	12 00
To cash received from Dr. H. T. Askew, for sale of *Transactions*, Wilmington, Del.	57 00
To cash received from Dr. H. W. De Saussure, for sale of *Transactions*, Charleston, S. C.	39 00
To cash received from Dr. Alden March, for sale of *Transactions*, Albany, N. Y.	27 00
To cash received from Dr. D. W. Enos, for sale of *Transactions*, Brooklyn, N. Y.	21 00
To cash received from Dr. E. L. Beadle, for sale of *Transactions*, New York, N. Y.	155 00
To cash received from Dr. J. N. Borland, for sale of *Transactions*, Boston, Mass.	54 00
To cash received from Dr. Charles Hooker, for sale of *Transactions*, New Haven, Conn.	105 00
To cash received from Messrs. Blanchard & Lea, for sale of *Transactions*, Philadelphia, Pa.	72 25
To cash received from Dr. Caspar Wister, for sale of *Transactions*, Philadelphia, Pa., as Treasurer . .	505 00
	$2,525 26
April 28. To balance on hand	806 20

in account with Caspar Wister, Treasurer.

	Cr.
April 15, 1858.	
By cash paid Nashville for draft at sight on Philadelphia	$6 04
By cash paid Baxter & Harley, for drawings on wood and engravings, less 5 per cent.	130 63
By cash paid T. K. Collins, for printing, binding, and paper, of 800 copies of *Transactions*, vol. x., with circulars, postage, and extra copies of papers of Drs. Posey and Worth, 5 per cent. off	1,173 90
By cash paid Baxter & Harley, for drawings and engravings on wood, 5 per cent. off	60 80
By cash paid Dr. W. A. Hammond, for prize essay, as awarded by committee	100 00
By cash paid Messrs. Blanchard & Lea, for boxes, freight, postage, &c.	60 30
By cash paid H. M. Barnes, for services as clerk .	50 00
By cash paid C. Sherman & Son, for circulars for Chairman of Committee of Publication	2 00
By cash paid for policy of insurance for $1500 on property of Association	12 00
By cash paid Treasurer's account for postage and stationery	20 90
By cash paid Chairman of Committee of Publication's account for postage	2 49
By cash paid Dr. H. F. Campbell for prize essay as awarded by committee	100 00
By balance on hand	806 20
	$2,525 26

We have audited the above accounts, and find them correct.

FRANCIS G. SMITH, Jr.,
Ch. Com. Pub.
H. F. ASKEW,
S. L. HOLLINGSWORTH,
SAMUEL LEWIS.

ADDRESS

OF

PAUL F. EVE,

PRESIDENT OF THE ASSOCIATION.

ADDRESS OF PAUL F. EVE,

PRESIDENT OF THE ASSOCIATION.

GENTLEMEN OF THE AMERICAN MEDICAL ASSOCIATION:

WE meet under most auspicious circumstances, and have been welcomed to the most favorable position ever occupied by our profession on this continent. The very ground on which we stand may be considered sacred; has been set apart from a common to a special purpose, and is national. Invited as we have been to this magnificent temple, furnished and dedicated, by a generous foreigner, to science; in the presence of that towering monument, designed to commemorate the worth of him ever enshrined first in the hearts of his countrymen; surrounded by the glorious recollections constantly associated with this government; and before the great men and assembled wisdom of the nation: it becomes us to discharge the important duties which have called us together, with honor to ourselves and benefit to our profession. Inspired by its benevolent spirit, and invoking the aid of an ever present and omnipotent God to preside over our deliberations; we may here renew our professional obligations, learn to love each other better, and resolve henceforth to be more faithful to our high vocation, that its dignity may be maintained and its usefulness extended.

Knowing, as I do full well, the value of time in our short sessions, and how much is expected from this meeting, the half hour set apart for this customary address will be restricted to subjects appropriate to the occasion. From this stand-point in the history of our meetings, it is proper to recall what has already been achieved, that we may be better prepared profitably to engage in the labor now awaiting our deliberations. This summary of our transactions is the more necessary, since, by a disastrous fire in 1851, the first four volumes of our proceedings have been destroyed, and are of

course inaccessible to all new members: the last report of the Committee on Publication having announced the fact that not one complete set of them was now on sale.

The grand object of a convention of the physicians of the United States, held the previous year in the city of New York, was carried into effect in Philadelphia, May, 1847, by organizing this Association; and, just ten years ago, the first general assembly met in Baltimore. Since then annual meetings have been convened in our large cities for the transaction of business, and the proceedings regularly published each year. Ten large octavo volumes now comprise the *Transactions of the American Medical Association*, being the contributions of its two thousand members delegated to represent the medical institutions of thirty States and Territories.

As set forth in convention, the ultimate purposes of this body are to cultivate and advance medical knowledge; to elevate the standard of medical education; to promote the usefulness, honor, and interests of the medical profession; and collaterally to enlighten and direct public opinion in regard to the duties, responsibilities, and requirements of medical men; to excite and encourage emulation and concert of action in the profession, and to facilitate and foster friendly intercourse between those engaged in it.

In carrying forward these desirable changes, embracing, as they do, medical science, medical education, and medical ethics, no one believes that we have done everything demanded for the good of the profession, or that all our great designs could have been attained in the brief space of ten years. The work assumed by the Association, it was well known, would take time, labor, and united efforts. It comprehended higher requisitions for admission into a learned profession; prescribed the course of instruction; demanded a separation in the teaching and licensing power; proposed a code to regulate the intercourse between physicians, their patients, and the public; and claimed that every one within its pale should assiduously cultivate the science of medicine and promote its best interests. And however extensive or radical may have been these contemplated plans, still, on the whole, it can safely be assumed that the American Medical Association has been no failure.

It has advanced medical knowledge, and promoted the usefulness of the medical profession. There will be found in the ten volumes of its printed *Transactions*, the results of the meetings held in Baltimore, Boston, Cincinnati, Charleston, Richmond, New York, St. Louis, Philadelphia, Detroit, and Nashville, that no less than

three hundred pages are devoted to medical education; over five hundred to hygiene, including the sanitary condition of many of our large cities; six hundred to botany and indigenous plants; one hundred and fifty to obstetrics; four hundred to medical literature; seven hundred and fifty to medical science proper; more than a thousand to surgery; and two thousand to practical medicine, including the epidemics and prevalent diseases of nearly every State in the Union.

Special reports have been made from committees appointed for the purpose, on the effects of anæsthetic agents, ether, and chloroform; on the influence of tea and coffee on the diet of children and the laboring classes; on the supposed influence of the cerebellum over the sexual propensities; the results of operations for the cure of cancer; the introduction of water and gas into cities; two reports on the blending and conversion of types of fever; the action of water on lead pipes and the diseases proceeding from it; reflexion of the uterus; a nomenclature of diseases adapted to the United States, having reference to a general registration of deaths; the sources of typhus fever and the means for their extinction; the permanent cure of reducible hernia; the topical use of water in surgery; the agency of refrigeration by radiation of heat as a cause of disease; the results of surgical operations in malignant diseases; the acute and chronic diseases of the neck of the uterus; the nature of typhoid fever; coxalgia or hip-joint disease; the treatment of morbid growths within the larynx; the sympathetic nerve in reflex phenomena; the medical and toxicological properties of the cryptogamic plants of the United States; erysipelas; the influence of the hygrometrical state of the atmosphere on health; the diet of the sick; pathology, causes, symptoms, and treatment of scrofula; the preservation of milk; the effects of alcoholic liquors in health and disease; hydrophobia; the changes in milk produced by menstruation and pregnancy; the sanitary police of cities; treatment of cholera infantum; use and effects of nitrate of silver applied to the throat; strychnine; infant mortality in large cities, the sources of its increase and means of its diminution; medico-legal duties of coroners; new principle of diagnosis in dislocation at the shoulder-joint; the flora, fauna, and medical topography of Washington Territory; the nervous system in febrile diseases, etc. etc.

Prizes have been awarded by the Association to the authors of

the following essays, viz: On the Corpus Luteum of Menstruation and Pregnancy, for 1851.

On the Variation of Pitch in Percussion and Respiratory Sounds in Physical Diagnosis, for 1852.

On the Cell, its Physiology, Pathology, and Philosophy.

And on the Surgical Treatment of Certain Fibrous Tumors of the Uterus, heretofore considered beyond the resources of art, for 1853.

On a New Method of Treating Ununited Fractures and certain Deformities of the Osseous System, for 1854.

On the Statistics of Placenta Prævia, for 1855.

On the Physiology and Chief Pathological Relations of the Arterial Circulation, for 1856.

On the Excito-secretory System of Nerves, its Relations to Physiology and Pathology.

And on Experimental Researches in relation to the Nutritive Value and Physiological Effects of Albumen, Starch, and Gum, when singly and exclusively used as Food, for 1857.

Carefully prepared reports have been published by the Association, of the various epidemics and diseases which have prevailed during the past ten years throughout our widely extended country, and the mortuary statistics and public health of our large cities minutely ascertained. Charts, maps, diagrams, tables, and plates, have been freely employed to illustrate these subjects, so important to the general welfare of the people. Every State and Territory, every large city and sick community, with scarcely an exception, has had its hygienic condition explored by this body; and dysentery and cholera, typhoid and yellow fevers, have specially claimed the attention of our members. The communications on deformities after fractures, found in our eighth, ninth, and tenth volumes, constitute the basis of the best monograph ever issued from the press. This work, it may be predicted, will do more than all others to check the reckless and speculative spirit of suits for malpractice against medical men; for in addition to teaching a useful lesson to the profession in the prognosis of fractures, its testimony is so conclusive in reference to the usual results of these accidents, that judicial decisions must hereafter be regulated by it.

Besides these contributions to medical knowledge, this Association has taken action to prevent the importation into our country "of worthless, adulterated, and misnamed drugs, medicines, and

chemical preparations," for which a member of the United States Senate has publicly declared that if we had accomplished nothing else, this alone should have entitled us to the gratitude of the nation; it recommended to the different States the adoption of a regular system of registration of births, marriages, and deaths; memorialized Congress to secure steerage passengers in our emigrant vessels medical attention, and due amount of space between decks; appointed a committee to ascertain the best means of preventing the introduction of disease by emigrants into our large cities; and considered many interesting individual cases.

This is a mere index to what the American Medical Association has done for medicine during the first ten years of its existence. A simple reference to the professional facts spread out upon its pages, is abundant and satisfactory proof how extensive, varied, and valuable are its contributions to medical science, and its ten volumes an overwhelming and congratulatory answer to the taunting proclamation of the *Edinburgh Review* of 1820: "What does the world yet owe to American physicians and surgeons?" In September, 1854, the editors of the *Association Medical Journal* of Great Britain published our code, and declared that this body of physicians were the most enlightened representatives of the greatest medical constituency in the world, of which it would be presumptuous in them to speak in terms of praise. They said of the volumes of the *Transactions* already published, that the duties of the standing committees have been ably and thoroughly performed; that the progress of medical science as a whole, its prominent divisions into practical medicine, surgery, and obstetrics, carefully and accurately traced in a series of reports worthy of the highest praise, had been reported in a clear, concise, and comprehensive manner, reflecting the highest credit upon the committees, and also upon the Association in selecting them for their respective duties: and in regard to what has been done in the laborious investigation of the indigenous medical flora of the Union; examination into and reports upon the adulteration of drugs; the sanitary condition of the various States, and difference between them in the public health; the study of epidemics and of special scientific subjects; the committees, continue these European medical authors, have collected and published a vast amount of highly valuable information. They moreover assert their belief that our success, especially in ethical reform, depends solely in the moral power

inseparable from a constitution based upon the principle of equal representation, which they affirm they not only greatly admire, but can scarcely refrain from envying.

Here, then, is a reply to the above invective pronounced against the medical profession of America, voluntarily called forth from the countrymen of its author, and before he had been in his grave ten years,[1] by the contributions of this body to medical science within seven years of its organization. Upon such disinterested evidence, such full, free, and candid confessions, and from such a source, may rest the claims of the American Medical Association for proof of the benefits it has conferred on medicine. A most active and powerful agent in disseminating useful medical knowledge on this continent, it is highly probable that no similar institution has ever been more successful in carrying out its chief object—the promotion of science—than the one now assembled in this hall.

It has done something, perhaps all it could under the circumstances, to elevate the standard of medical education. An influential motive calling forth this organization, was the proposed attempt to correct the defects in the plan of instruction and conferring the degree then generally adopted in our medical colleges; and one of the first resolutions passed, even when the profession had assembled in convention, was the creation of a committee to report at an early day on these exciting subjects. Improvement in the system of teaching medicine, and a change in the power granting the diploma, if not reformation in the schools, have ever since agitated the profession, and consumed a considerable portion of the time of our sessions. The only power to control the economy of the colleges which this body possesses is exclusively moral, advisory, or recommendatory, and not legislative or legal; and while it may be true that no set of resolutions presented by the several committees have been fully carried into effect, still it cannot be denied that important changes, calculated to advance medical education, have nevertheless been made. At least seven professors now compose the Faculty in all our schools, the one or two exceptions to this being in those in which the science is taught nine consecutive months. Not less than a period of four full months' instruction now constitutes a course of lectures, and even this is exceeded in most of the institutions. But one annual course is

[1] Sidney Smith died in 1845.

now delivered with scarce an exception, and an interval is thus allowed for reading or private instruction. The Association has clearly defined what shall be taught. It has inquired into the practical operations of all the colleges in the land; scrutinized the general condition of medical teaching in every State; compared it with that of the most enlightened nations; called attention to preliminary education and declared what it ought to be; advised higher requisitions and a more rigid examination for obtaining the degree; and has, by its free discussions and oft reiterated expressions in regard to the business of teaching and regulating the schools, undoubtedly prevented greater abuses. It has never ceased to urge at every meeting the pressing necessity for a more thorough preparation and greater attainments in candidates for the honors of the profession.

This subject, gentlemen, is one upon which you will be called to take action. A committee chosen at Nashville is to report here on medical education. It is composed of gentlemen from different sections, who, while familiar with the systems of teaching medicine in our country, are yet disconnected from all the colleges. It would seem to be a desirable object to settle, at this meeting, the future relation of the schools to this Association. Our sessions then might become less educational in character, and hereafter more scientific. And at the present stage of our proceedings, after all that has been said and done on this subject, the time has surely arrived for a decision. I cannot believe the colleges have any interested motives before this body; they of all others should be the last to oppose a more thorough cultivation of medicine, and ought by such a course to become unworthy of their trust, and unwelcome members of a great national congress of physicians, whose grand design is to promote medical science. We have now reached a period in our history when this voluntary Association is to determine what medical organizations, be they State, county, or city societies; hospitals, boards or schools, are entitled to be represented in its meetings. It alone can, of course, prescribe the requisitions for its own delegates. If created to improve and advance medical education (and this is in accordance with its own expressed declarations), then it is quite certain the schools must be controlled. It has but to speak on this point and it will be obeyed; for it is now too late for any physician to oppose, or any medical college to set at defiance the moral power of this body.

As to the first object of an ethical nature over which the Association designed to exert its influence, that of enlightening and directing public opinion in respect to the duties, responsibilities, and requirements of medical men, we are free to confess little or nothing has been done. Nor is there much probability that any great change will soon, if ever, be effected. The work itself, in the very nature of things, is utopian. How is it possible to enlighten or direct the public mind on the economy of a science which it practically denies to exist? We ought to recollect that the time has not long passed since grave professors in our colleges signed certificates recommending nostrums; or what was done even last year in London at Middlesex Hospital, by its regular surgical staff: these reminiscences, however unpleasant, may serve somewhat to moderate our indignation against those who would insult the profession, or who entertain a very low estimate of the scientific acquirements of physicians, even at the present day. The profession must first fully comprehend its duties and responsibilities, and the proper and special qualifications for the practice of medicine, before any attempt can succeed to get the public to appreciate what these are, or acknowledge the ethical impropriety of employing secret remedies. If we make no distinction between the regular and irregular practitioner, between the physician and the proprietor of a nostrum, we are alone censurable that two such opposite characters are so generally confounded by the community. Until we are more honest, more united, truer to ourselves and our calling, and cultivate a proper *esprit du corps*, in vain is it to expect a change in public opinion regarding medical science. To prevent disease or relieve the sick is a most benevolent and honorable vocation, and when one conceals for selfish ends a valuable medicine, he ceases to be honest and is void of philanthropy; for by attempting to place a moneyed valuation upon pain and life, he becomes a trader in human physical sufferings; he estimates in dollars and cents the groans and tears of his fellow-creatures. He may profess what he pleases, but his piety is not of the Bible, and has not a jot or tittle of Christianity about it, for that teaches us to love our neighbors as ourselves. Eschewing politics, proposing to control medicine alone, taking its management from unprofessional trustees, and seeking no aid from State or Church, we should become a law unto ourselves, or rather act above all law save the divine, since it is quite certain we alone must protect the honor of the

medical profession. And thank God, standing this day, before this goodly assembly, and at the capital of our common country, I can announce that here, to the American Medical Association it may with safety be forever confided. By its recent acts, proclaimed throughout the length and breadth of this wide domain, this body has denounced all fellowship with irregular practices, and erected a barrier impassable to honor and respectability.

Having learned wisdom from a more careful examination of the statistics and results of deformities after fractures, the question occurs if we have not ourselves unwittingly made patients expect too much from remedial agents. Disease in itself is a destructive process, which we can only prevent or relieve, and as, of course, we cannot create or restore, should we not therefore be more chary of the little word "cure?" The monument erected to Ambrose Paré, the father of surgery, bears the modest inscription in reference to the wounds he treated: "Je les pansay, et Dieu les guarit."[1] Empirics may boast that they cure, and doctors of divinity may sustain them; but the physician knows it is God who healeth all our diseases.

On that branch of ethics which relates to ourselves, that of encouraging emulation and concert of action among physicians, and fostering friendly intercourse in the profession, the Association has been eminently successful. It has far exceeded the most sanguine expectations in overcoming all opposition; in creating an admirable code now adopted everywhere; in organizing State, county, and city societies; in bringing together physicians from the remotest parts of our immense territory; in awaking the whole profession to its true interests; and in blending us into a common harmonious fraternity. Without law or authority, but by moral suasion have we been united as one man, and possess this day the power to be felt over this entire continent. There never has been a more propitious period for medicine in America; never greater evidence of vitality and extended usefulness in our ancient and benevolent calling; never better feeling or more confidence of success than now, by our united effort to do good in the great cause of suffering humanity.

We have seen, gentlemen, how much this Association has achieved in its infancy to elevate honorable medicine. A wide field for

[1] Ancient French.

scientific investigation is before us; much territory still remains to be redeemed; the wilderness is yet to blossom as the rose; and the leaves to be gathered for the healing of nations. The hygienic condition of the nation, of such immense interest to our people; that first all-important question, ever before the profession—the prevention of disease—is to be improved. We are to search after truth, and when found it is to be generously applied for the good of mankind. The work is a self-sacrificing and benevolent one, but it is grand and sublime, even God-like; for it has to do with pain and disease, life and death. And we rejoice to know that whenever or wherever called upon, the members of our profession and of this Association have never failed in any duty, and have been faithful to the end. Yea, many of them have stood alone between the living and the dead, and cheerfully laid down their lives to stay the pestilence and destroyer.

The very waters at our feet, as they sweep onwards to the ocean, pass in sight of a city where three years ago no less than four-fifths of our profession in that community, swelled too as their ranks had been by volunteers from this body, fell manfully contending with disease and death: and on a late occasion, when one of our steam-packets, having been injured by a collision, went down in an instant, carrying every soul on board into the depths of the ocean, among the passengers was a member of this Association. To the inquiry where was he during the heart-rending scenes of a sinking ship, freighted with human lives, promptly came the affecting and sublime eulogy from one who knew him well, that so long as a woman or child remained unprovided for, he[1] never left the ill-fated Arctic. How near akin was his gallant spirit to that of him, who, during a subsequent and similar occurrence, after seeing every woman and child committed to his care safely rescued from his foundering bark, after sending the last parting message to his family, and discharging every duty without one lingering ray of hope, calmly assumed his commanding position on the deck of his vessel, and as she glided from under him into the yawning billows, instinctively uncovered to meet his fate and his God. While the wild waves are sighing a requiem over the unseen burying places of these illustrious dead, the benedictions of a grateful people are continually ascending over the forty graves

[1] Prof. Carter P. Johnson, M. D., of Richmond, Va.

of the martyred heroes of Norfolk. These were our companions, who died in the noble service of that calling, to promote the best interests of which has assembled us together.

Gentlemen of the American Medical Association, we have convened for important purposes; great events are before us; the interests of humanity are here; the hopes of the profession are in this meeting; the eyes of the medical world are upon us. May we then so act in view of surrounding circumstances, that "The skill of the physician shall lift up his head, and in the sight of great men he shall be in admiration."

REPORT

ON THE

MEDICAL TOPOGRAPHY AND THE EPIDEMIC DISEASES OF KENTUCKY.

BY

W. L. SUTTON, M.D.,
GEORGETOWN, KY.

REPORT ON THE MEDICAL TOPOGRAPHY AND THE EPIDEMIC DISEASES OF KENTUCKY.

In preparing myself to discharge the duties imposed upon me by the Association, I have addressed circulars to the physicians of the State freely; besides writing many letters, and, when circumstances would admit, making personal applications. I am sorry to say that my efforts have been less successful than on any former occasion. I account for this thus: In our State, there are not a great many physicians who are willing to take the pains necessary to enable them to make a satisfactory report of their cases. And some of those who have preserved records, from procrastination, press of business, or other causes, have neglected to analyze their cases and report the result. As to those who, heretofore, have so kindly given me their aid, it is fair to presume (as indeed has been stated by some), that they had nothing to add to the observations already furnished, of sufficient interest to require additional communications. Indeed, I am not aware of any epidemic having prevailed extensively in our State. Besides, it would obviously be improper to encumber the *Transactions* with a repetition of reports made in vol. v., vi., and vii. The only paper which I have received is one on Milk-sickness or Sick Stomach, which I have introduced entire, and to which I have added some remarks, as to causes, &c., which my reading and oral information concerning that disease, seemed to warrant.

In addition to my inquiries of the profession, I addressed to each member of the General Assembly of Kentucky queries as to the topography of their respective counties. I received answers as to some forty-five counties, which are analyzed and reduced to tabular form, as a means of convenience and of saving space.

I have introduced some tables, prepared with some care and trouble, intended to elucidate the prevalence of some of our more

common epidemic diseases, in the different counties of the State; as also the proportional prevalence in regions of different geological formations—as also others intended to manifest the natural history of certain diseases as regards their connection with color, age, and sex, of patients and the time of prevalence.

The State of Kentucky is situated between 36° 30′ and 39° N. latitude, and 82° and 89° 30′ W. longitude from Greenwich. It is 400 miles long, very much varying in width, but averaging upwards of 100 miles, with an area of about 40,000 square miles. With a little fancy, one might say that its form was not much unlike a huge stomach, of which the North Bend of the Ohio River—in which the counties of Boone, Kenton and Campbell are situated, may represent the cardiac orifice; and the space west of the eastern line of Graves and McCracken counties, continued to the Ohio River, and including Graves and McCracken, Ballard, Hickman and Fulton counties, may represent the pyloric.

As might very well be expected, this large section of country is made of different geological formations. The lowest surface rock which appears in the State is the blue limestone, which is found to commence a little above Maysville (which was long known by the name of "Limestone," from this formation); taking a circuit south by Winchester to Stanford, and then curving northwest by Springfield, it afterwards runs north to Madison, Indiana. This limestome is covered by a soil exceedingly rich and productive, known as the blue-grass section of the State. This portion of the State is in a high degree of cultivation. This blue limestone is skirted by belts of cliff limestone, and of coral limestone of narrow dimensions; at the west extending to the foot of the Falls of the Ohio. Encircling these limestone formations is the black lingula shale, also of narrow dimensions. External to this border is a belt of subcarboniferous sandstone, also of narrow extent. To the east of this belt we have a border of conglomerate, or puddingstone, made up of coarse pebbles, of quartz, and smaller grains of sand, rounded and cemented together by silicious matter. This border, crossing the Ohio River and extending from Portsmouth, Ohio, to Greenupsburg, Kentucky (about twenty miles), runs in a S. W. direction to where the Cumberland River crosses the Tennessee line. East of this range of conglomerate is the eastern coal field, which extends through the adjacent regions of Virginia and Ohio to the vicinity of Lake Erie. It is said to be the largest coal field known.

Just here, it may be well to remark on the very singular running together of the different formations of limestones, lingula shale, and sandstone, which is observable in the vicinity of Stanford. It will be observed, too, that in this neighborhood, viz., at Mount Vernon, we find the subcarboniferous or cavernous limestone emerging between the sandstone and the conglomerate. All of these formations are thinned out, and converge along the line running west of south to the Turkey Neck of the Cumberland River and Tennessee line. Here, in the deep ravines, the blue limestone still appears, overlaid by other formations, so much thinned that the whole can be crossed in a few rods. West of this line, the cavernous limestone again appears, and underlies most of the State from this to the Mississippi River.

In the northern portion of what is called the Green River country, the southern coal field is situated, surrounded by its border of conglomerate.

The cavernous limestone, mentioned above, underlies that portion of Kentucky known as the Barrens. This country originally differed from prairie, in having many small bushes growing upon it, intermixed here and there with a few small oaks of a peculiar kind, known as *black jacks;* but nothing worthy of being called timber. Large bodies of land have an exceedingly rich soil; but other portions are of inferior quality. The surface is marked in many places by *sink holes*, being conical depressions of from twenty or more yards in diameter, to two or three acres, and ten to thirty feet deep. These are supposed to be occasioned by subterraneous cavities, which permit the surface to sink. In this formation the Mammoth Cave is situated. Of this cave it is said "the known avenues amount to 223, the united length of the whole being estimated, by those best acquainted with the cave, at 150 miles; say that the average height and width of these passages amount to seven yards, each way, which is perhaps near the truth, this would give upwards of 12,000,000 cubic yards of cavernous space, which have been excavated by calcareous waters and atmospheric vicissitudes." (*Geological Survey*, vol. i. p. 81.) Truly it is difficult to conceive how this can be so. Besides this, there are many others of limited extent. In this region it frequently happens that streams of some size sink and run under ground for several miles, and then reappear at the surface.

These sink holes, caves, and subterraneous streams, however, are not confined to the regions of cavernous limestone, as they exist

also in the blue limestone region. Within twenty miles of Lexington, there are many small caves and sink holes, and perhaps a dozen instances, in which small streams run into caverns and reappear at distances varying from three to ten miles. And in Carter County, where the cavernous limestone is not known to be on the surface, but where it most likely may be at no great depth, a quite extensive cave has been recently discovered.

Upon the accompanying map, I have endeavored to give the geological formations of the State, as they exist under the soil or quaternary deposit, according to the best information within my reach.

Kentucky is many times conceived to be, if not the most beautiful country on the face of the earth, certainly one of the most beautiful—a land agreeably uneven and undulating—with a soil unsurpassed in fertility, where originally the most majestic forests abounded, but which have now given place to the finest farms, fringed with the most luxuriant blue grass pastures, upon which are grazed horses and cattle of the best breeds, and of unsurpassed beauty. And truly, a portion of the State is blest with a beauty of aspect, a fertility of soil, and a salubrity of climate which ought to satisfy any one, who can be satisfied with an earthly paradise. This portion is not very large, but it is so favorably located, that almost every person coming into the State sees more or less of it, and it has thus given its character to the entire State. Like all extensive portions of the earth, it varies very much in its aspect, in different portions. On the eastern end of the State is a portion bounded by Virginia on the east, and by a line commencing at the mouth of Little Sandy River (Greenupsburg), and running southwest to the point at which the western limits of Clinton intersect the Tennessee line; corresponding very much with the line on the map, marked 7–8, embracing the eastern coal field.

This portion is traversed by the Cumberland Mountains, and is very mountainous, with narrow valleys. As we go west of the line above mentioned, the hills diminish in height and steepness, and valleys become more extended. This range may be, upon an average, fifty or sixty miles wide.

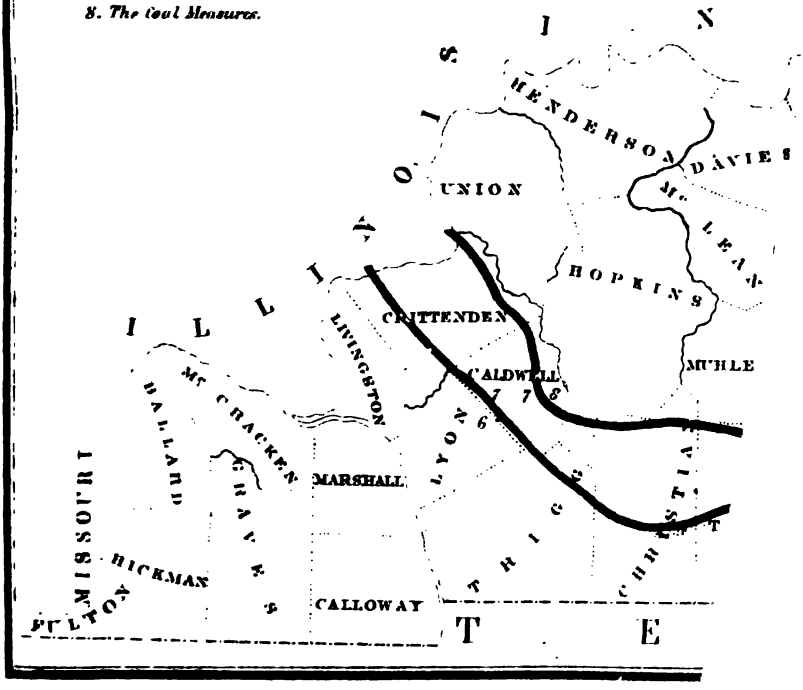
No other portion of Kentucky can properly be called mountainous; but spurs of the Cumberland Mountains run off in two or three places to the Ohio River, so as to make sections of the country quite hilly. In general, the remainder is agreeably uneven, and susceptible of cultivation in a high degree.

KENTU

EXPLANATION.

The region marked 1 represents the Blue Lime stone region.

2. *The Chain Coral, Cliff or Magnesian Lime stone.*
3. *The Coralline Falls Limestones.*
4. *The Black Lingula Shale.*
5. *The Sub carboniferous Sand stone.*
6. *The Subcarboniferous, Cavernous Limestone.*
7. *The Conglomerate Formation.*
8. *The Coal Measures.*



Mills. Immediately ...

... ... in a high degree.

Upon the Ohio River, from the mouth of Big Sandy to Louisville, there is, at places, a river bottom extending back from the river a quarter or half a mile, when there is an abrupt elevation, sometimes a precipice of stone, of some two to five hundred feet; at other points this precipice is the river bank. Below Louisville, the hills, in some places, run into the river, but not so frequently, and as a general thing, the river bottoms are much wider, having, in many places, what is called a "second bank." This bank, or abrupt elevation, may be some six to fifty feet, and bounds the extent of high water, all between it and the river being overflowed in very high water; but all back of this, though it may be, and generally is, as level as that nearer the river, is free from overflow.

The rivers of the State are the Ohio, which flows along the whole northern border of the State, following its course from the mouth of Big Sandy to the Mississippi, a distance of six hundred and forty miles; the Mississippi, which bounds the State on the west for one hundred miles; and the Big Sandy, which bounds it on the east, some two hundred miles to its source in the Cumberland Mountains. Besides these, we have, traversing the State, the Little Sandy, Licking, Kentucky, Salt, and Green Rivers. The Cumberland rises near the southeastern limits of the State, and after meandering in a direction south of west, crosses the Tennessee line near Tompkinsville, in Monroe County; and after running through that State some three hundred miles, re-enters Kentucky in Trigg County, and running west of north, empties into the Ohio River at Smithland. A few miles, some ten or twelve west of the Cumberland, the Tennessee River also enters Kentucky between Trigg and Calloway counties, and running nearly parallel with the Cumberland, enters the Ohio at Paducah. These rivers serve to indicate, to some degree, the elevation of the surface of the country bordering on the Ohio River. Near their sources, they are confined in narrow, and rather deep beds, and rarely overflow their banks to any serious extent. Rising in the mountains, the fall is considerable, and consequently velocity is great; but as they approach the Ohio, the country becomes more level, and the current much slower. In the Ohio River, the range between high and low water varies, according to the width and elevation of the river bottom, from sixty to eighty feet. Immediately above the falls at Louisville, the range is said to be forty feet. It is doubtless less here than on any other point on the river, owing to the rapid discharge of water over the falls. Immediately below the falls, it is sixty-four feet five inches.

Here, again, the velocity acquired by the water in passing the falls causes it to pass off rapidly, so as to lessen the height to which it would rise if the current were of the ordinary speed. I do not know whether the range of high water at Carrolton (at the mouth of the Kentucky River) is affected by the falls which are about fifty miles below, or what the range at that place is—probably about the average range. This much being premised, I will apply the observation above, that the rivers traversing Kentucky serve to indicate the inclination of the earth's surface near the Ohio. The back-water, in time of great floods, sometimes reaches Frankfort, which is on the Kentucky River, seventy-five miles by water, and about fifty in a direct line from the Ohio. In the Big Sandy, the back-water extends about thirty miles, although this is in the mountainous region. In the Licking, it extends forty miles.

For the purpose of determining the face of the country, &c., in each county, I addressed a series of questions to each member of the General Assembly of the commonwealth. I received answers as to forty-four counties—not quite one-half in the State—which being from every section of the State, may be considered as giving a tolerably correct statement as to the whole State. These answers are embodied in the following table, and, taken in connection with the remarks on the geological characters of the country, will give as correct a view of the topography of the State as I am able at this time to procure.

Table exhibiting the Physical Aspects of fifty-eight Counties of Kentucky.

EXPLANATION OF ABBREVIATIONS.—*b. s.* Badly supplied. *con.* Considerable quantity. *ex.* Extensive. *g.* Generally. *l.* Little. *m.* Much or many. *v. m.* Very much or many. *n.* None. *sc.* Scarce. *sev.* Several. *p.* Plenty. The fractions have reference to the whole surface.

COUNTIES.	Level.	Hilly.	Mountainous.	Overflowed.	Mill ponds.	Locks and dams.	Height from rivers.	Originally barrens.	Limestone.	Freestone.	Water hard.	Water soft.	Drinking water.	Sulphur springs.	Chalybeate.	Saline.	Coal mines.	Iron ore.
Adair	1/10	9/10	n	n	10	n	100	n	1/2	1/2	1/2	1/2	p g	m	m	m	n	n
Bath	1/2	1/2	1/2	n	8	n	100?	n	1/2	1/2	1/2	1/2	p	m	m	2	ex	v m
Breathitt	1/4	1/4	1/4	n	n	n		n	n	1	n	1	g	sev	n	ex	ex	some
Calloway	1/4	1/2	n	1/50	6	n	75	1/8	n	1	n	1	p	n	n	n	n	p
Campbell	1/4	3/4	n	1/10	4	n	300	n	1		1		g	n	n	1	n	n
Carroll	1/2	1/2	n	1/350	n	1	200	n	3/4	1/4	3/4	1/4	g	n	n	n	n	n
Carter	1/2 ?	n	3/4	1	25	n	2	n	n	1	n	1	good	sev	sev	m	ex 1/2	ex
Christian	3/4	1/4	n	n	15	n	200	3/4 ?	3/4	1/2	3/4	1/2	p	sev	sev		ex	—
Clarke	3/4	1/4	n	1	20	n	500?	n	3/4	1/2 ?	3/4	1/4	g	m	m	some	n	1
Crittenden	1/2	1/2	n	?	10	n	100	n	1/2	1/2	1/2	1/2	g	sev	sev	n	ex	ex
Estill	1/2	1/4	1/4	1	20	n	500?	n	1	n	1	n	p	m	m	sev	ex	1/4
Fleming	1/10	9/10	n	1/350	12	n	350	n	9/10	9/10	9/10	9/10	p	m	m	n	n	n
Floyd	1/6		5/6	1/50 ?	25	n	600	n	1	n	1	n	p	2	n	1	ex	p
Garrard	1/2	1/2	n	n	n	n	250	n	g	n	n	g	p	—	few	n	n	n
Grayson	1/2	3/4	n	n	9	n	100	1/2	n	1	n	1	p	sev	n	n	ex	
Greene	1	1	n	1	sev	n	400	3/4	1	n	1	n	g[3]	few	n	1		
Greenup	1/2 ?	1/2	1/2	1	?	—	200?	—		g	—	1	p	some	some	m	ex	ex
Hardin	1/2	1/2	n	1/10	7	n	100	3/4	g	n	g	—	p	sev		sev	1	p
Harrison	1	1/2	n	1	4	n	200	n	1	n	1	n	g[3]	few	n		n	n
Hart	1	1	n	1	sev	n	400	3/4	1	n	1	n	g	few	n			
Hopkins	3/4	1/4		1	n	n	?	1	n	1	g		b s				ex	some
Jessamine	3/4	1/4	n	n	12	n	300	n	1	n	1	n	g	n	2		n	n
Johnson	1/6	n	5/6	1/50 ?	25	n	600	n	n	1	n	1	p				ex	p
Kenton	3/4	1/4	n	1/350 ?		n	600	n	1	n	1	n	b s	1	n	n	n	n
Knox	1/2	3/4	3/4	1	n	n	350	n	n	1	n	1	p	1	n	n	1	1
Larue	3/4	1/4		1	7	n	200	1/2	1	n	1	n	p	1	n	n	n	n
Laurel		1/2	1/2	—	?	—	250	—	—	1	—	1	p	some	some		1	1
Lawrence	1/6	5/6		1/50	3	n	400	n		1		1	p	n	sev	sev	p	ex

[1] Estill Springs.

[2] A few families carry water 1 mile.

[3] In some places scarce.

Table exhibiting the Physical Aspects of fifty-eight Counties of Kentucky.—Continued.

COUNTIES.	Level.	Hilly.	Mountainous.	Overflowed.	Mill ponds.	Locks and dams.	Height from rivers.	Originally barrens.	Limestone.	Freestone.	Water hard.	Water soft.	Drinking water.	Sulphur springs.	Chalybeate.	Saline.	Coal mines.	Iron ore.
Letcher			1				2500	n	n	1	n	1	p	n	n	n	ex	
Livingston	1/4	3/4	n	n		n	200	1/8	1	n	1	n	p	n	n	n	n	con
Madison	3/8	3/8	1/5	1	13	n	200	n	3/4	1/4	3/4	1/4	p	1	1	1	some	some
Marion	3/4	1/4	n	n	20	n	1200	n	1	n	1	n	sc	sev	sev	n	n	n
Marshall	9/10	1/10	n	n	11	n	200	1/8	n	1	n	1	p	n	n	n	n	
Mason	3/4	1/8	n		4	n	412	n	1	n	1	n	sc	n	n	n	n	n
McCracken	3/4	1/4	n	n	20?	n	50	1	1/8	3/8	n	1	p	n	n	n	1	1
Meade	1/2	1/2	n	1/10	12	n	200	3/4	g		1	n	p	sev	n	sev[1]	1	1
Monroe	1/2	1/2	n	1	20	n		n	1	n	1	n	p	1	n	n	n	n
Morgan	1/4	1/2	1/8	n	6	n		n	n	1	n	1	g	sev	n	1	p	some
Muhlenberg	1/2	1/2	n	1/10	8	1	60	n	n	1	1	n	g	sev	sev	n	1/3	1/3
Nelson	1/5	4/5	n	1	1	n	50	n	1	n	1	n	g	n	n	n	n	ex
Nicholas	1/10	9/10	n	1/100	6	n	350	n	1	n	1	n	p	n	n	2	n	n
Ohio	3/4	1/4	n	con	6	1		n		1	n	1	g	sev	n	n	ex	p
Oldham	1/2	1/2	n	1	n	n	200	n	1	n	1	n	p	few	n	n	n	n
Owen	3/4	1/4	n	1	8	2	300	n	1	n	1	n	p	1	n	some	n	n
Pendleton	1/3	2/3	n	n	2	n		n	1	n	1	n	p	1	n	n	1	n
Perry			1			n	2500	n	1/2	1/2	1/2	1/2	p	n	n	n	ex	
Pike	1/4	—	3/4	n	20	n	500	n	n	1	n	1	g	1	n	n	ex	
Pulaski	1/2	1/2	1/3	n	100	n	200	1/30	1/2	1/2	1/2	1/2	p	n	sev	1	con	ex
Rockcastle	1/5	4/5	4/5	1	n	n	350	n	1/2	1/2	1/2	1/2	g	1	n	m	1	1
Rowan	n	1	n	n	3	n	350	n	n	1	n	1	p	m	m	n	some	p
Scott	1/2	1/2	n	1	15	n	500	n	1	n	1	n	p	sev	n	sev	n	n
Simpson	1/2	1/2	n		4	n		3/4	1	n	1	n	b s	1	1	n	n	n
Spencer		1		1	4	n	100	n	1	n	1	n	b s	few	n	n	n	n
Taylor	1/5	4/5	n	1		n	200	1	1/2	1/2	1/2	1/2	p	1	n	1	n	n
Trigg	1/2	1/2	n	1/100	7	n	80	1/5	1	n	1	n	p	1				p
Trimble	1/2	1/2	—	3/100	—	1	200	—	3/8	1/8	3/8	1/8	p	n	—	sev[2]	—	—
Union	3/8	5/8	n	1/30	10	n	100	n		1	1/2	1/2	b s	3	2	1	1	1
Whitley	1/5	4/5	4/5	1	40	n	350	n	n	1	n	1	p	1	1	n	1	1

SETTLEMENT OF KENTUCKY.—Without paying any attention to the hunters and explorers who visited the territory now known as Kentucky, from about the year 1750, and afterwards, I may briefly remark that, in 1775, the first families arrived in Kentucky, viz: those of Boone, Denton, M'Gary, and Hogan. In 1776, Dec. 6, the Legislature of Virginia established the *County* of Kentucky, and in the next year courts of justice were first organized. In 1780, the *County* of Kentucky was divided into three, Lincoln, Fayette, and Jefferson counties. In 1792, a State Government was organized.

When the white man first visited Kentucky, there were no inhabitants in the land; neither does tradition point to the time when there were inhabitants. And yet, there are traces in a few places which seem to declare that at a period not very remote—say from ninety to one hundred and fifty years—particular spots had been permanently occupied. Near Strodes Creek, in Bourbon County, there were vestiges of a large Indian town, consisting of the remains of double rows of lodges, or huts, inclosing three small mounds in a line. At the distance of about one hundred rods was a regular burial ground. Many bones of the animals of the country were found on an elevation near by; and on another, was what seemed to have been a place where the bodies of the dead were burned; or that where prisoners were tortured, as there coals, ashes, and calcined human bones were found. Trees growing upon this spot were of the same kind as in the immediate vicinity; but all had the peculiarity of growing two or three very close together, as if they had sprung from the stumps of former trees, yet having vitality in them. A number of these trees, having been cut down by the owner, gave the uniform age of ninety years as marked by the annulations. This would seem to show that the occupancy of the spot had not continued long. The position of the bones gave sure indication that the fate of the inhabitants had been both sudden and tragical.

But it is certain that, at a period very long anterior to this, the country was permanently held by a race who had made considerable advances in civilization and arts, as evinced by very many traces of fortifications and mounds. Amid the fortifications, some of which were constructed of regular masonry, were found copper tools, which indicated that some progress had been made in working the copper mines, probably of the northwest. When, or how long those people occupied the land; what became of them, are utterly unknown, and perhaps will ever be veiled in obscurity. It

would seem clear that they had not existed within the last eight hundred or thousand years—that they were considerably advanced in the arts; and that they had enemies of a corresponding grade.

I have said that the white man found no inhabitants living in this vast region. The country was well stocked with game of various kinds, buffalo, elk, bear, deer, &c. &c.; and here the various Indian tribes of the adjacent regions—the Cherokees, Creeks, and Catawbas of the south, and the Shawnees, Delawares, and Wyandots of the north—hunted their game, and frequently engaged in those deadly hostile encounters which are so common in the Indian history.

It will be remembered that the settlement of Kentucky commenced, and was mainly effected during the Revolutionary war that all the Indian tribes were under the influenee of Great Britair and in direct hostility to the American people; and that the infan settlement in Kentucky was separated by an immense, almost in passable wilderness from the older settlements. It is little wonde then, that all the neighboring Indian tribes, with one conser turned their hostile arms against the feeble band of adventure with a determined resolution to extirpate them. From 1775 1794, when Gen. Wayne finally defeated the Indians, there was incessant warfare, carried on in every conceivable manner, and w a loss of human life which is scarcely credible. War parties every size, from a single individual to fifteen hundred men, perhaps most commonly from ten to fifty, were continually in quisition, either to avenge an incursion of the Indians, or for an vasion of their villages.

To give some idea of the sanguinary character of the con which were continually occurring, I may remark, that when Indians surprised a "station" the most of the inhabitants tomahawked. If they took any prisoners and found thems pursued by the whites, the first thing was to tomahawk the pr ers. In the battles, the loss was always heavy. In the bat the Blue Licks, out of one hundred and sixty-six, or as son counts state, one hundred and eighty-two whites, sixty were l In many battles, when the number engaged was small, or were killed. At Estill's defeat much more than half were k

To show the obstinacy and coolness which characterized encounters, as well as to exhibit a favorable specimen of c and tactics among the Indians, I will give a brief account battle.

In May, 1782, a party of Wyandots, twenty-five in number, invested Estill Station, killed a white man, took a negro prisoner, destroyed the cattle and retreated. Capt. Estill raised a company of twenty-five men to pursue and chastise them. He overtook them just as they had crossed Hinkston Creek. His men immediately opened a fire upon the retreating Indians, who at first manifested a disposition to run; but their chief being severely wounded, ordered them, in a loud voice, to stand and fight. They promptly took trees and returned the fire. Estill's men immediately did the same. The numbers were equal, and no shot was fired but at a direct object. The exposure of any part of the body was almost sure to be greeted by a rifle ball; the firing was deliberate, and life generally the forfeit. Thus, on both sides, they firmly stood, or bravely fell. The battle had lasted more than an hour, and more than a fourth had fallen on both sides, without any appreciable advantage to either; when Capt. Estill, being unwilling to lose so many men with no advantage, except killing an equal number of the enemy, sent six of his remaining men by a circuit to reach the rear of the Indians. From some unknown cause the movement was not executed with as much celerity as was expected, and necessary to success. In the mean time, the Indian chief had noted the slackening of the fire in front, and perhaps attributed it to the right cause. He immediately made a rapid charge across the creek with his whole force, drove the whites from their covert, and compelled them to retreat with great slaughter. In this charge Capt. Estill and eight of his men were killed, and four badly wounded, who, however, made their escape. The Indians lost half their number, and the whites much more. The battle lasted two hours, and for cool personal intrepidity has, perhaps, never been exceeded. (*Collins' History of Kentucky.*)

Will I be borne with, for introducing another narrative illustrating the "perilous times" which then existed in Kentucky? It seems to me conducive to the proper understanding of the subject in hand. The hero, for he well earned the title, lived many years, and died within half a mile of the spot where I am now writing.

Capt. William Hubbell was a native of Vermont, and was returning to Kentucky in 1791, in a flat boat, in which there were nine men, three women, and eight children. Unmistakable evidences of the vicinity of Indians having been observed, they anticipated an attack. Capt. Hubbell was made commander, and every

exertion used to put what arms they had in the best order. The nine men were divided into three bodies, who were to watch alternately. About sunset, on 23d March, our party overtook a fleet o six boats, with which they at first intended to keep company. Bu it soon appearing that they spent their time in fiddling and dancing and would not heed the remonstrances of Capt. H., he determine to leave them, and proceed alone. One of the boats set forwar with him, but soon the crew went to sleep, and the boat fell behin During the night, indications of a hostile attack were observe Arrangements were made for protecting the women and childre by placing them on the floor of the boat, and surrounding the with the trunks and baggage. In this condition, they spent t night. Just at daybreak, a plaintive voice from the shore begg them to land, as there were white persons who wished to ge passage in the boat. This was at once recognized as an Ind artifice, and therefore an additional incentive to preparation.

Soon afterwards, three canoes, containing some twenty or twe five men each, were seen in pursuit. Chairs, tables, &c., w thrown into the river, in order to leave the boat clear. Every had his position assigned him, with directions not to fire until Indians were very near, and one to fire at a time, so that t should be no interval. As soon as the canoes came within mu shot, a general volley was discharged from one of them, w wounded one man, breaking his thigh, and another just belov ribs. The canoes were ranged at the bow, the stern, and o right side, so as to rake in every direction. The fire from the now commenced, and put a damper upon the confidence of th dians. The captain, after firing his own gun, took up one belonged to a wounded man, and was on the point of firing, a bullet took off the cock. He coolly turned around, and s a brand from the caboose, discharged his piece with effect. A lar fire was now kept up on both sides. The captain now ball to pass through his right arm, and disabled him. Scarce he recovered from the shock, and recovered the use of his which had been suddenly *drawn up* by the wound, when served the Indians in the canoe at the bow, upon the p boarding his boat, some of them actually having their hand He immediately seized a couple of horseman's pistols, and forward to repel them. On his approach, they fell back son He killed the foremost man, and having discharged both and having no time to reload, he seized a billet of wood, and

them so forcibly and actively, as to prevent them from entering the boat. At length he wounded one of them so severely, that, with a yell, they suddenly gave way. All the canoes then discontinued the contest, and directed their course to the boat which had fallen back during the night. The crew of this boat made no resistance, but huddled into the cabin in dismay. The Indians rowed the boat to shore, killed the captain and a boy, and placing the women in the midst of the canoes, and manning them with fresh hands, again set out in pursuit of Capt. Hubbell's boat. A melancholy alternative now presented itself to Hubbell's party, either to fall a prey to the savages, or to run the risk of killing the women, who had been placed in the canoes, as a protection to the Indians. They determined to defend themselves to the last extremity, and at every hazard. In the boat, there were but four men capable of making resistance, and Capt. Hubbell was severely wounded in two places. The second attack, however, was resisted with incredible firmness and vigor. Whenever the Indians would rise to fire, their opponents would give the first shot, which generally proved fatal. Notwithstanding the great disparity of numbers, and the exhausted condition of the whites, the Indians at length despaired of success, and the canoes, one after another, turned to the shore. Just as the last one was departing, Capt. Hubbell killed, or badly wounded, an Indian who was standing in the stern. During the last contest, the boat had drifted near to the shore, where some four or five hundred Indians were collected, and rushing down the bank. The only two men, who had escaped unhurt, were placed at the oars; and as the boat was not more than twenty yards from the shore, all hands were directed to lie down in the safest position they could find, and the oarsmen ordered to propel the boat onward, and into the stream, with the utmost rapidity. Whilst they were in this dangerous situation, nine balls were shot into one oar, and ten into the other. At this time, too, one of the wounded men, though solemnly warned by Capt. H., could not withstand the temptation to shoot a particular Indian, whom he saw on the bank. He accordingly rose to shoot, but immediately received one ball in his head, and another in his heart. By the aid of the oars and the current, the boat was speedily carried beyond the reach of the Indians' guns, when our little band, reduced as they were in numbers, wounded, afflicted, exhausted by fatigue, and some of them by loss of blood, but still unsubdued in spirit, assembled in all their force, men, women, and children, and, with an air of triumph, gave three

cheers. Of the nine men, three were killed, and five severely wounded. Of the women and children, all escaped unhurt except one little boy, who, after the battle was over, came to Capt. H., and asked him to take out a ball, which had lodged between the skin and bone of his forehead. When that had been done, he said "*That is not all*," and raising his arm, showed that his arm had been shot at the elbow, the bone broken, and the limb retained by the skin alone. Upon being asked by his mother why he had not told her of his wounds—"Because," said he, coolly, "the captain directed us to be silent during the fight, and I thought you would make a noise if I told you."

Exhausted as was Captain Hubbell by watching (he had not slept since he left Pittsburg), fatigue, and loss of blood, he was compelled to steer the boat with his left hand till 10 o'clock at night, the others being engaged in rowing. At that time, they came to settlements, and obtained aid. The captain, as soon as relieved from labor and responsibility, sunk under the weight of pain and fatigue, and remained long insensible.

Upon examining the boat, after reaching Limestone, it was found that there was scarcely a space two feet square, in which there was not either a bullet or a bullet-hole; and some persons, who had the curiosity to count them, averred that, through the blankets which were stretched as curtains at the stern of the boat, one hundred and twenty-two bullet-holes were found in a space five feet square.

Those who first explored these wild regions returned to their respective homes, giving the most animated and glowing accounts of the delightful climate, the sublime scenery, and astonishing richness of the soil. As a consequence, the eyes of whole sections of country became directed to this El Dorado. It soon became evident that, however desirable the country was, it was not to be enjoyed without great risk as well as labor—that those who had an overweening love for their own "scalps" could wear them more securely anywhere else. Hence, an athletic frame, a willing mind and an ability to endure great privation and fatigue, an unflinching personal courage, a quick eye and acute ear, a mind quick to perceive and prompt to execute any expedient necessary for attack or defence, with an indomitable perseverance, were necessary characteristics in those who cast their fortunes in this wilderness. Many of such stamp came from all the older settlements; many of

were inheritors of good names, earned by their ancestors; many more here achieved a name for themselves and their posterity, which promises to be both lasting and illustrious. Any character possessed by Kentuckians is not the effect of anything peculiar in the soil or climate, but is the necessary result of such men being in a position where every man was expected to be ready at a moment's warning, to make a foray or repel an incursion of the Indians.

Preparatory to a history of the epidemics, it seems proper to give a brief sketch of the manners and customs, diet, &c., of the earlier immigrants. In doing this, I do not know that I can give a better idea, in as short a compass, than may be obtained from the following extract from Collins' *History of Kentucky:*—

"In an early day, what would now be considered the indispensables of life, were by no means to be obtained. There were no merchants, from whom they could be purchased, if there had been money to pay for them. In coming to the country, each family brought what they could; but as they had to be brought several hundreds of miles, through a wilderness and over mountains, through which there were no roads; and as a pack horse or two were the means of transportation, it is not to be wondered that the outfit was in the highest degree restricted. Every man had his rifle, tomahawk, and scalping-knife. These were indispensable; but after these, other articles were obtained, or not, according to circumstances. Knives and forks, tin cups or pans, were articles of luxury. The table-ware was usually composed of wooden trenchers, bowls, &c., or of coopered vessels. An iron vessel or two for cooking and washing, belonged, perhaps, to most families, but not to all. The sideboard consisted of a couple of pins stuck into the side of the house, on which was laid a clapboard or two. The clothing of the family was hung upon pins, around the walls. The house was usually some fifteen or eighteen feet square, composed of small logs, covered with clapboards, which last were kept on the house by smaller poles laid on them. The houses were of a single story; but usually had a *loft* above, which was a kind of store-room, in which many articles were kept, and in which the younger members of the family frequently slept. The floor was sometimes made of puncheons. [As every reader may not know precisely what a clapboard or a puncheon is, I will describe them. A clapboard was about four feet long, eight to twelve inches wide, and a half or three-quarters of an inch thick, made by 'riving' or splitting bil-

lets of timber from the surface to the centre; this being always a little thicker at one edge than the other. A 'board tree' must be very straight in the grain and tough in texture; and the neighborhood which could furnish a crosscut-saw to cut off the timber, and a froe to 'rive' the boards, was fortunate. Puncheons were portions of logs split and laid with each end on a sleeper, having the upper surface somewhat smoothed off with the broad-axe. They were half the length of the room.] But very many floors consisted of the earth only. The chimney was built up of timber, usually split, for a few feet, and then of narrow pieces of boards alternatin with clay, until it was above the roof of the house. The fireplac when stone was convenient, was lined with stone; if not, a fram was made on the inside, leaving a space of some twelve or fifte inches inside of the outer frame of the chimney. This space w filled by pounding clay into it, until it was perfectly solid. T bedstead was made by boring an auger hole in a proper place the floor, in which a piece of forked timber was inserted. From t fork, two rails running to, and inserted into corresponding side the cabin, formed the frame, and some clapboards formed the s port. A table formed of a broad puncheon, with four legs inse in as many auger-holes, and a few three-legged stools of the s mahogany, or square blocks, completed the furniture.

"The forts, stockades, block-houses, or, as they were comm called, 'stations,' were composed of inclosures of greater or les tent, having one or two sides composed of cabins two stories the upper story projecting one or two feet beyond the lower. was to prevent the Indians from scaling the walls, as also to pr them from taking shelter close to the walls of the houses. other sides of the inclosure were composed of puncheons twelve feet high inserted side by side in the ground. Th these puncheons, as also through the outer walls of the ca suitable distances, were 'port-holes,' through which the oc could fire upon assailants. The stations, like the dwelling finished without a nail or hook of metal.

"The food was plentiful and substantial, consisting of the wild animals, with which the country abounded. The br made of Indian corn, and was not always very plenty. Ve of various kinds were more or less plenty. Keen appetites condiments unnecessary.

"The dress was of primitive simplicity. Females wo gowns and petticoats made of linen or linsey-woolsey of t

manufacture; a 'kerchief covered the bosom. On special occasions, they wore stockings and shoes, or moccasins; a buckle, a ring, or anything of that kind was a rare article. The wild nettle and buffalo wool supplied, to a considerable extent, the place of flax and wool. The men universally wore hunting shirts, breeches and moccasins. All these were sometimes made of dressed buckskin; the breeches and hunting shirt most commonly of linen or linsey. The lower portion of the hunting shirt was sewed up in front, as high as the stomach, and girded to the body by a belt; thus affording a pouch on each side, for carrying many articles which the hunter or warrior might need—bread, jerk, *i. e.* venison beaten dry and smoked, gloves in winter, tow for wiping out the rifle, &c. To the belt were attached the tomahawk and scalping-knife.

"The outward religious ceremonies consisted in a *quasi* observance of the Sabbath, so far as to make it a day of rest or feasting for older, and of play for the younger. It was the day for social dinners. The evils of this custom have not yet disappeared from even the best portions of the State.

"But if religious duties were neglected, the social were in a high state of cultivation. If a family was known to need any particular thing, it was sure to be supplied. If a house was to be 'raised,' the day was set and the neighbors invited. It was usually finished in a day. Nothing which a man had was too good for his friend, 'and stranger was a holy name.'

"Public opinion required that each man should hold himself in readiness to make a foray or repel an invasion, and a neighborhood soon became too hot for a man who was found to need urging. Personal valor, with a promptness to perceive and execute what was necessary for attack or defence, stamped the value of a man.

"Personal and family honor were held in the highest estimation. Bastardy and seduction were rarely known. It is thus seen, that the people were 'warm friends, or bitter enemies.'"

During the last fifty years, a great change has been effected in the condition, manners, and customs of the people. We have now men of great wealth, surrounded by all the elegancies and extravagancies which are sure to be required by those who are able to command them. Over the great body of the State, the inhabitants, although not wealthy, are very comfortable livers, rarely suffering any serious privations in anything important to ease and comfort. The means of sustaining a family can always be commanded by a

fair degree of industry and economy. Yet, in different regions of the State, considerable differences exist as to the ease and convenience of procuring a livelihood. In some of the counties of the State, it is said that a wheeled carriage of any kind has never found its way. In the mountainous portions generally, the facilities are fewer, and of course the body of the people live in a manner more nearly approaching that of the first settlers, upon a diet plain, plentiful, substantial, and eaten with a good appetite.

The people almost universally eat three meals a day. In, perhaps, a majority of families, flesh of some kind, or fish, composes a part of every meal. Generally coffee or tea, most commonly the former, is used for breakfast and supper, attended by butter and bread of Indian corn and wheat, baked in various manners. Dinner usually consists of bacon, with beef, pork, mutton, or chickens—a plenty of vegetables of the season, followed by a dessert of pudding, pies, or other pastry. Corn bread is most commonly th principal bread at this meal. Milk is also used in a majority c families at every meal.

Our farmers kill, during the fall, from two hundred and fifty four hundred pounds of pork to each member of the family—o and young, black and white—to be made into bacon. During t year, fresh meats are added as convenience admits, and inclinati prompts.

Spirituous liquors were more or less freely used by the inha tants of Kentucky from the earliest times, when they could procured. It was almost universal to keep spirits in the hous be offered to visitors, even by those who never tasted anyth of the kind, and most men drank once or oftener during the Many drank once before breakfast, dinner, and supper, and a other times. Others drank once before breakfast or dinner, ar no other times. No malt liquors were used, except in and ar towns. Some thirty years ago, a movement in favor of te rance was commenced, which has had the effect of banishin bottle as a necessary item of hospitality, and it is now rarel duced; but it is difficult to say whether intemperance is les is certain that fewer, much fewer, persons drink any spirits that, perhaps, causes those who do drink to be more notice the number seem to be larger.

What has been said, has had reference to the whites; bu than one-fourth of our population is colored, and it is pr say something of them. Of the colored race, 220,992 were r

by the U. S. census in 1850. Of this number, again, 10,011 were free, and 210,981 were slaves. What I have to say, at present, relates to the slaves; but in everything else, except as relates to a master, it is very applicable; to the free, with this exception, that when there is a choice, it is in favor of the slave. Our slaves, then, occupy a *quasi* family relation to the master, rather more near to the real, than *quasis* usually are. The master feels the same obligations in kind, though, of course, not in degree, as towards his own children. If an injury or an injustice is done to a slave, it is felt and resented as an indignity offered to a member of the family. If a slave commits an offence against the laws, his master employs counsel for his defence, and attends to the case, so as to give him a fair chance for an acquittal. If the crime is punishable with death, and the circumstances are such as to give reason to believe that conviction will follow, the master, if within his power, is apt to run him off beyond the State jurisdiction. And now, when some capital offences may be commuted into imprisonment for life, the master usually urges any interest which he and his friends may have with the executive, to have that privilege extended to his slave. This is done without any reference to the interest of the master, for the State pays a liberal price to the owner, when a slave is condemned; but because the master feels that the slave has no means of protecting himself, and does not understand the using, to the best advantage, any means within his reach. The master feels many times a severe conflict between his duty to the State, and what he conceives to be his duty to his slave; as a member of the community, he feels it is his interest that the laws of the State be properly executed; but, as the protector of his slave, he feels bound to give him every facility to escape; and, as is usually the case, when State and family ties come in conflict, the latter are apt to prevail. On the part of the slave, too, he feels identified with the family in its prosperity and in its adversity. He is proud of his master's prosperity, and dejected at his failures. If his master suffers a series of misfortunes, his feels that his slaves are the last things he will relinquish. It is true he knows that it is his lot to do the hard work of the family, but he likewise knows that more is not required of him than he can conveniently do. He knows that he will not be unnecessarily exposed to heat, cold, or inclement weather. He feels assured of good, substantial fare, and suitable clothing, and that he will be well provided for in sickness, and in old age. With these convictions, he is usually contented, happy,

and merry. They all have facilities—some more and some less—to earn something for themselves, and as they have no necessary outlay for food or clothing, they can always make a genteel appearance on Sabbath, or a holiday. Indeed, it is no unusual thing to see them as well or better dressed than their owners. Many of them have horses, &c., of their own, although the law gives them no protection in property. Many have money at interest; and it occasionally happens that a slave has bought his wife and children, and emancipated them. I have seen funeral processions 150 or 200 yards long, in which several carriages appeared, conducted with great propriety and decorum. I hope I may be excused for copying an extract from a visitor from the North (understood to be a distinguished Presbyterian minister), writing from Lexington, Ky., under the name of "*Irenius*." Speaking of different colored persons with whom he came in contact—"On Sunday, he dresses a well as his master; and as to his wife, Charles sends to Philadelphi for silk for her dresses, and has them made by the most fashionabl dressmaker in that city. Charles gave an entertainment to hi friends upon the occasion of his sister's marriage, and not conte with the handsome provision for the table which his mistre kindly furnished, he had the confectioner from town to supply t pyramids, in a style that was not to be surpassed by any weddi feast in Lexington." Again—"Our testimony is, that the int course between master and slave is kinder and more consider than between master and servant at the North; and the serv here acts more *freely*, and lives with less appearance of servil anxiety, and depression, than the laborer on a farm in the States." In the first Registration report for Kentucky, the foll ing sentence is found: "The conviction is now hazarded, when observations shall have been sufficiently numerous and continued to authorize the formation of a judgment, it will be fc that, *so far as health and longevity are concerned, the slaves in the s holding States are in a better condition than that class, of any n most nearly assimilated to them in social position.*" Upon this po have been the more full, because of a conviction that the rela of master and slave are very much misunderstood everyv north of Mason and Dixon's line.

Our Registration reports, thus far, show that there is a som shorter life to the slave than to his master. Upon what caus depends—whether the want of adaptation of his constituti our climate, the relative want of accuracy with which he r

the first approaches of indisposition, or to the want of care as to general hygienic rules—I am not prepared to say. Certain it is, our slaves are very much disposed to roam about at night, frequently staying from home until a short time before day; thus sleeping but little, and that little sitting up, or lying upon a floor without covering. Perhaps all the causes mentioned have something to do in determining a somewhat diminished life.

Climate.—Kentucky being situated between the northern and southern portions of the United States, has a climate considerably variable in temperature. She occasionally has the heat of the south and the cold of the north. During the winter of 1856–7, the temperature was noted at various points in the State, at from 20° to 30° below zero. In most winters we have several days with a temperature at sunrise of from zero to 15° below. In the winter of 1855–6 and of 1856–7, we had a continuous frost of two months or more; during which time the weather was steadily cold and pleasant. The thaw took place so gradually, that our dirt roads never became bad; which is an almost universal thing in the month of March. During most summers, we have a few days in which the thermometer rises to 90°, or above it—rarely to 100°, except when the thermometer is influenced by reflected heat. We sometimes suffer considerably from drought, and occasionally we have torrents of rain, as well as spells of rainy weather of several days' continuance. I do not think that the equinoxes are more apt to be rainy or boisterous than other seasons. We have no extended observations, with which I am acquainted, by which we can determine the hyetal,[1] or hygrometric condition of our atmosphere. I, however, introduce the quantity of rain and snow, reported from Newport Barracks, for three years, 1851, '53, and '54, observing, that for 1851 a doubt is expressed by an interrogation (?).

I may remark that, for many miles around Lexington, there is little disease of a malarial origin. Dr. Drake tells us of a student of medicine, who was cured of an enlargement of the spleen—the result of intermittent fever—by a residence in Lexington, and without medicine. I have had an opportunity of seeing several such

[1] The term *hyetal* has been suggested in the *Army Meteorological Register*, as the proper one to express the amount of water precipitated in the form of rain and snow (in place of *ombrometric*), by Profs. Johnson and Turner. As the latter word can scarcely be said to be established, and as the authority in favor of hyetal is high, and as it has great advantage in both length and euphony, I have chosen to use it.

cases, in students who had come from the South to Georgetown College; as also obstinate intermittents removed by very little medicine. To which I may add my own case. From a residence in a malarial district, I had contracted serious hepatic disease, which had continued some years, and reduced me very much. In 1833, I removed to Georgetown, and very soon found my health improving without medicine. I steadily increased in weight from 160 to 225–40 pounds.

I give below some tables showing the result of observations of the thermometer for a number of years, returned from Newport Barracks; the observations having been made, as I understand, at the Observatory, Cincinnati, about 500 feet above the surface of the Ohio River. Premising that 55° is the average annual temperature, as determined at Louisville, Kentucky, and 58° at Nashville, Tennessee; and 55°–56°, the temperature of several of the best springs in Scott County, Kentucky, as determined by myself in a hot, dry time in 1851.

The first two of the following tables are from the *Army Meteorological Register*, lately published. The remainder are from Prof. Drake's *Diseases of the Valley of North America*, and are compiled from observations made by Prof. Ray, of Cincinnati. They are, therefore, the index of a point just exterior of the most northern portion of the State.

TABLE I.

Average Mean Monthly Temperature at Newport Barracks. Lat. 39° 05′; Long. 84° 29′. Altitude above the Ohio River about 500 feet; above the Gulf of Mexico about 1,000; for fourteen years, 1835–48.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Mean of 7½ years	34.04	36.94	45.46	53.39	64.72	73.49	76.48	75.02	68.21	55.81	44.71	34.84
Mean of 18 years[1]	33.50	34.10	43.40	54.50	63.50	71.10	76.30	73.70	65.50	53.00	42.30	33.80

TABLE II.

Average Mean Temperature of each Season, returned from Newport Barracks.

	Spring.	Summer.	Autumn.	Winter.	Year.
Mean of 7½ years	54.52	75.00	56.24	35.27	55.26
Mean of 18 years[1]	53.80	73.70	53.60	33.80	53.70

[1] Observations by Prof. Ray, Cincinnati, about 250 feet above the Ohio River.—*Army Meteorological Register.*

Table III.

Maximum Temperature of each Month for fourteen years, 1835–48, *at Cincinnati, Ohio.*

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Whole year.
1835	66°	56°	70°	83°	91°	95°	93°	89°	86°	82°	76°	63°	95°, June 13.
1836	61	62	71	91	89	95	99	95	93	80	68	55	99, July 23.
1837	53	66	73	89	95	95	95	94	90	80	75	73	95, July 15.
1838	69	51	85	85	87	93	97	100	91	84	65	54	100, August 9.
1839	66	70	79	83	94	94	96	95	88	88	61	48	96, July 25.
1840	55	75	75	91	89	93	96	93	85	82	71	58	96, July 16.
1841	54	58	83	82	93	99	98	96	93	76	72	64	99, June 12.
1842	65	69	85	90	88	95	92	88	94	84	77	69	95, June 22.
1843	67	58	59	88	93	97	98	92	92	77	68	60	97, July 1.
1844	56	70	72	89	89	90	94	93	89	76	75	64	94, July 6 & 14.
1845	62	70	77	93	91	94	95	95	86	76	68	51	95, July 21.
1846	67	55	69	88	91	91	96	95	92	81	73	66	96, July 10.
1847	67	60	72	86	88	92	92	90	89	83	75	60	92, July 18.
1848	60	60	86	84	90	91	90	92	86	75	59	73	92, August 14.
Highest max.	69	75	86	93	95	99	99	100	94	88	77	73	

Table IV.

Minimum Temperature for each Month, in fourteen years, 1835–48, *at Cincinnati, Ohio.*

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Whole Year.
1835	3°	—17°	1°	21°	40°	45°	48°	46°	33°	29°	3°	9°	—17°, February 8.
1836	0	—7	—4	25	38	52	55	48	40	27	15	3	—7, " 3.
1837	5	8	20	26	39	52	57	52	42	26	22	7	+5, January 3.
1838	8	—10	11	28	36	53	59	62	39	30	14	—4	—10, February 22.
1839	13	5	2	32	36	46	54	47	31	32	2	8	+2, March 4.
1840	—1	0	21	27	42	47	50	57	41	19	18	7	—1, Jan. 2 & 19.
1841	—7	4	18	30	37	53	59	59	42	25	25	18	—7, " 18.
1842	9	—5	25	27	36	45	56	53	40	27	8	0	—5, February 17.
1843	2	—2	1	26	41	38	50	53	48	19	22	15	—2, Feb. 7 & 16.
1844	—1	15	20	28	45	54	65	56	38	26	15	8	—1, January 29.
1845	19	8	18	20	34	51	49	50	40	25	11	—6	—6, December 20.
1846	10	0	20	27	43	46	57	64	44	28	15	19	0, February, 26.
1847	—3	5	14	26	36	47	54	52	38	27	19	2	—3, January, 8.
1848	—4	17	5	31	40	50	58	61	40	36	25	24	—4, " 10.
Least min.	—7	—17	—4	20	34	38	48	46	31	19	2	—6	—17

Table V.

Monthly Range of Temperature at Cincinnati, in fourteen years, 1835–48.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Whole year.
1835	63°	73°	69°	62°	51°	50°	45°	43°	53°	53°	73°	54°	112°
1836	60	69	75	66	51	43	44	47	53	53	53	52	106
1837	48	58	53	63	56	43	38	42	48	54	53	66	90
1838	61	61	74	57	51	40	38	38	52	54	51	58	110
1839	53	65	77	51	58	48	42	48	57	56	59	40	94
1840	56	75	54	64	47	46	46	36	44	63	53	51	97
1841	61	54	65	52	56	46	39	37	51	51	47	46	106
1842	56	74	60	63	52	50	36	35	54	57	69	69	100
1843	65	60	58	62	52	59	48	39	44	58	46	45	99
1844	57	55	52	61	44	36	29	37	51	50	60	56	91
1845	43	62	59	73	57	43	46	42	46	51	57	57	101
1846	57	55	49	61	48	45	39	28	48	53	58	47	96
1847	70	55	58	60	52	45	38	38	51	56	56	58	95
1848	64	43	81	53	50	41	32	31	46	59	34	49	96
Ext. range	70	75	81	73	58	59	48	48	57	63	73	69	

Table VI.

Greatest Change of Temperature within twenty-four hours in each Month for fourteen years, 1835–48.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Whole year.
1835	33°	37°	37°	37°	35°	31°	32°	30°	33°	31°	30°	28°	37°
1836	27	35	32	43	46	33	38	28	30	32	36	30	46
1837	27	25	32	40	42	31	30	35	22	31	32	31	42
1838	29	31	30	37	38	31	28	28	37	35	34	36	38
1839	25	35	31	38	35	35	39	33	35	40	29	19	40
1840	31	38	41	38	33	30	25	27	32	35	40	33	41
1841	21	30	30	37	36	33	30	28	30	35	31	21	37
1842	35	30	43	43	43	34	28	29	34	41	44	34	44
1843	31	31	32	34	36	38	34	32	29	38	28	26	38
1844	28	31	33	37	33	28	25	26	32	31	35	27	37
1845	32	38	39	43	42	32	30	33	31	39	35	32	43
1846	29	29	35	40	32	30	24	23	27	33	32	25	40
1847	22	27	33	42	38	30	25	25	29	36	29	30	42
1848	28	27	40	40	38	30	23	20	27	29	22	29	40
Great. change	35	38	43	43	46	38	39	35	37	41	44	36	

TABLE VII.

Table showing the amount of Rain which fell in each season of the year, for three years, 1851–53, *and* '54, *and for the year, at Newport Barracks, Ky.*

Year.	Spring.	Summer.	Autumn.	Winter.	Year.
1851	21.43	17.64	19.44	25.16	83.67?
1853	9.69	7.90	13.40	7.40	38.39
1854	16.67	6.28	7.20	10.15	40.30
1850	25.66?	29.38?	11.87	...	...
1852	12.28	8.70	10.27	...	...
Average	17.15	13.98	12.44	14.24	52.47

To the above three complete years, I have added two fractions, with the average of each season. If the observations are correct, it would show that we are subject to great variations as to month, season, and year, in the quantity of rain; but the number of observations is too small, and too questionable, to be reliable as averages.

MEDICINAL WATERS.—In Kentucky we have many mineral springs, only a few of which have attracted much attention. Those most extensively known are the Lower Blue Lick, the Harrodsburg, the Olympian, the Big Bone, the Bedford, and the Paroquet.

I was in hopes to be able to furnish an analysis of many of these waters, but have been disappointed.

The following are all which I have been able to procure, and which seemed to justify insertion. They are mostly derived from the Report of the Geological Survey—the qualitative analyses are understood to have been made at the source, and furnished by the Principal Geologist, Dr. D. D. Owen. The quantitative, by the Chemical Assistant, Robert Peter, M. D. For the Harrodsburg and Paroquet Springs the authority is given. I subjoin, first the qualitative and then the quantitative. It will be observed that all these waters are from a very few counties, leaving a very large portion of the State unrepresented.

QUALITATIVE.

1. YELVINGTON SPRING (Daviess County)—

Free carbonic acid; bicarbonate of lime; bicarbonate of magnesia; chloride of sodium; a trace of oxide of iron.

2. "ALUM SPRING," at the base of Burdett's Knob—

Sulphates of alumina and protoxide of iron; bicarbonate of lime; bicarbonate of magnesia.

It has strong astringent properties, and is undoubtedly deleterious to health.

3. YATES SPRING, near the base of Knob Lick (Boyle County)—

Bicarbonate of lime; bicarbonate of magnesia; chloride of sodium; sulphate of soda; sulphate of magnesia.

4. ROCHESTER MINERAL SPRING (Boyle County)—

Sulphate of magnesia; sulphate of lime; sulphate of soda? probably a *small quantity* of alumina? and a trace of sulphate of protoxide of iron.

5. JANES' MINERAL WATER (Washington County)—

Free sulphuretted hydrogen, strongly impregnated; chloride of sodium; sulphate of soda; sulphate of magnesia; bicarbonate of lime; bicarbonate of magnesia.

6. R. B. GRIGSBY'S "WHITE SULPHUR MINERAL WATER" (Nelson County)—

Free sulphuretted hydrogen (tolerably strongly impregnated); chloride of sodium; sulphate of soda; sulphate of magnesia; bicarbonate of lime; bicarbonate of magnesia.

7. "MAMMOTH WELL" (Nelson County)—

Chloride of sodium; bicarbonate of lime; bicarbonate of magnesia; sulphate of soda; sulphate of magnesia; and a trace of iron.

It is a feeble tonic, and mild aperient and alterative.

8. WHITE SULPHUR MINERAL WATER (Marion County)—

Free sulphuretted hydrogen; chloride of sodium; sulphate of soda; sulphate of magnesia; bicarbonate of lime; bicarbonate of magnesia; a little carbonate of soda.

This water is distinctly alkaline.

9. CAMPBELLSVILLE "SULPHUR WATER"—

Free sulphuretted hydrogen; sulphate of soda; sulphate of magnesia; chloride of sodium; chloride of magnesium; bicarbonate of lime; bicarbonate of magnesia; trace of carbonate of soda.

10. WASHINGTON BELL'S "SULPHUR SPRING" (Marion County)—

Free sulphuretted hydrogen, and trace of sulphuret of alkali; chloride of sodium; sulphate of soda; sulphate of magnesia; bicarbonate of lime; bicarbonate of magnesia; carbonate of soda.

11. THE HOWELL MINERAL WELL (Hardin County)—

Sulphate of magnesia; sulphate of soda; chloride of sodium; bicarbonate of lime; bicarbonate of magnesia; bicarbonate of protoxide of iron; carbonate of soda.

12. WATER, two miles from Dowlingsville (Grant County)—

Bicarbonate of magnesia; bicarbonate of lime; chloride of magnesium; sulphate of soda (small); sulphate of magnesia; sulphated, and perhaps dissolved, alumina.

13. BEDFORD SPRING (Trimble County)—

Chloride of sodium; sulphate of soda; sulphate of magnesia; bicarbonate of lime; bicarbonate of magnesia; carbonate of soda.

It has an alkaline reaction to test paper.

14. "BIG LICK" (Gallatin County)—

Free sulphuretted hydrogen; sulphate of magnesia; sulphate of soda; chloride of sodium; bicarbonate of lime; bicarbonate of magnesia; carbonate of soda.

15. THE "HARDINSVILLE SULPHUR SPRING" (Franklin County)—

Free sulphuretted hydrogen; chloride of sodium; bicarbonate of lime; bicarbonate of magnesia; trace of sulphate of soda; trace of sulphate of magnesia; carbonate of soda?

This water seems to have a feeble alkaline reaction.

16. REUBEN JESSU'S MINERAL WATER (Woodford County)—

Free sulphuretted hydrogen; chloride of sodium; bicarbonate of lime; bicarbonate of magnesia; trace of sulphate of soda; chloride of magnesium?

17. BIG BONE LICK (Boone County)—

Sulphuretted hydrogen (which escapes in intermittent volumes, proves the water to be saturated with this gas); chloride of sodium; sulphate of magnesia; sulphate of soda; sulphate of alumina; bicarbonate of lime; bicarbonate of magnesia; carbonate of soda.

This water has an alkaline reaction.

18. THE STONE SPRING (Lincoln County)—

Sulphate of magnesia; sulphate of lime; chloride of sodium; carbonate of iron; carbonate of lime; and carbonate of magnesia.

This is remarkably *pure* water and slightly chalybeate. Very few spring waters contain so small a proportion of saline matter as this, which has only about one-third of a grain to the avoirdupois pound.

19. SOCIAL HILL MINERAL WATER—

Free sulphuretted hydrogen; bicarbonate of soda and potash? sulphate of soda; a little chloride of sodium, and probably sulphuret of sodium?

20. CHAMELEON SPRINGS (Edmonson County)—

Small quantity of free sulphuretted hydrogen; free carbonic acid gas; sulphate of soda; chloride of sodium; bicarbonate of lime; bicarbonate of magnesia a trace; sulphate of magnesia a trace.

21. Mr. Swinney's Chalybeate Water—

Free carbonic acid gas; bicarbonate of the protoxide of iron; bicarbonate of lime and magnesia; small quantity of chlorides, probably chiefly chloride of sodium.

22. Crittenden Spring (Crittenden County)—

Free light carburetted hydrogen (saturated); free sulphuretted hydrogen; chloride of sodium; chloride of calcium? and magnesium?; sulphate of soda (small quantity); sulphate of magnesia; probably also small quantities of carbonate of soda; bicarbonate of lime and magnesia?

QUANTITATIVE.

1. Mr. John Wilson's Well (on Cheapside, Lexington, Ky.)—(Free carbonic acid in 1 lb. Troy. 1.9521 grains. 4.1300 cubic inches.)

Composition of Saline Contents.

	In 1 lb. Troy.
Carbonate of iron	0.3150[1]
Carbonate of lime	1.8293[1]
Carbonate of magnesia	.1280[1]
Sulphate of lime	.2455[1]
Silica	.0687[1]
Chloride of sodium	6.6620
Chloride of potassium	.2880
Chloride of calcium	4.1865
Chloride of magnesium	2.2067
Sulphate of magnesia	.2117
Bromide of magnesium	.0990
Silica	.1160
	16.3525

Harrodsburg Springs, Mercer County.—At this watering-place there are several springs, more or less differing from each other. I subjoin the analysis of the two principal springs, which are chiefly used by invalids.

2. The Greenville Spring—(Ingredients in a pint of the water, stated in grains and hundredths, Troy).

Bicarbonate of magnesia	2.87
Bicarbonate of lime	0.86
Sulphate of magnesia (crystallized)	16.16
Sulphate of lime (crystallized)	11.06
Chloride of sodium, a trace.	
	30.95

[1] In the insoluble portion on evaporation.

3. THE SALOON, OR CHALYBEATE SPRING—(Quantity of water the same).

	Grains.
Bicarbonate of magnesia	0.43
Bicarbonate of lime	4.31
Bicarbonate of iron	0.50
Sulphate of magnesia (crystallized)	27.92
Sulphate of lime (crystallized)	10.24
Chloride of sodium	1.20
	44.60

DR. C. H. RAYMOND.

4. PAROQUET SPRINGS—(In one gallon of water contains sulphuretted hydrogen 30 cubic inches, carbonic acid 6 cubic inches).

Chloride of sodium	309.6000
Chloride of calcium	67.7100
Chloride of magnesium	48.0300
Chloride of potassium	0.4860
Sulphate of soda	2.4120
Sulphate of lime	2.2800
Sulphate of alumina	0.4920
Carbonate of soda	0.3780
Carbonate of lime	2.4000
Carbonate of magnesia	1.5060
Carbonate of iron	0.1800
Iodide of sodium	0.1560
Iodide of magnesium	0.2460
Bromide of sodium	0.1800
Bromide of magnesium	0.3120
Silica	3.9000
Organic matter	2.1360

PROF. J. LAWRENCE SMITH.

5. GROVE SPRING (Crab Orchard, Lincoln County, Ky.).—The *composition* of this mineral water was found to be, in 1000 grains of the water—

Carbonate of iron	0.021[1]
Carbonate of manganese	.005[1]
Carbonate of lime	.195[1]
Carbonate of magnesia	.041[1]
Sulphate of magnesia	.056
Sulphate of potash	.013
Chloride of sodium	.013
Silica	.040

Nitric acid, a trace.

[1] Held in solution in the water by carbonic acid.

6. "Brown Spring" (Lincoln County, Ky.).—The *composition* of this water was found to be, in one thousand grains—

	Grains.
Carbonate of iron	0.028[1]
Carbonate of manganese	.005[1]
Carbonate of lime	.117[1]
Carbonate of magnesia	.020[1]
Sulphate of magnesia	.112
Sulphate of lime	.015
Sulphate of potash	.028
Chloride of sodium	.018
Silica	.046
Moisture and loss	.053
The free carbonic acid, also present, was not estimated.	
	.442

7. "Field Spring" (Lincoln County, Ky.).—The *composition* of this mineral water may be thus stated, in one thousand grains of the water—

Carbonate of iron and manganese	0.015[1]
Carbonate of lime	.139[1]
Carbonate of magnesia	.131[1]
Sulphate of magnesia	.066
Sulphate of soda	.024
Sulphate of potash	.022
Chloride of sodium	.008
Silica	.041
	0.446

8. "Howard Well" (Lincoln County, Ky.).—The *composition* of the water is as follows, in 1000 grains—

Carbonate of magnesia	0.065[1]
Carbonate of lime	.013[1]
Sulphate of magnesia	.012
Sulphate of potash	.008
Alumina and trace of phosphate	.002
Chloride of sodium	.017
Silica	.022
Moisture and loss	.025
	0.164

It contained also sulphuretted hydrogen, and carbonic acid gases—amount of which was not estimated.

[1] Held in solution by carbonic acid.

9. "Epsom Springs," No. 1 (Lincoln County, Ky.).—*Composition* in 1000 grains of the water—

	Grains.
Carbonate of lime	0.673[1]
Carbonate of magnesia	.116[1]
Carbonate of iron, a trace.	
Sulphate of magnesia	3.454
Sulphate of lime	.203
Sulphate of potash	.067
Sulphate of soda	.774
Chloride of sodium	.081
Silica	.060
	5.428

10. "Foley's Epsom Springs" (Lincoln County, Ky.).—The *composition* of this water may be stated as follows, in 1000 grains of the water—

Carbonate of lime	0.912[1]
Carbonate of manganese	.131[1]
Carbonate of iron, a trace.	
Sulphate of magnesia	3.520
Sulphate of lime	.185
Sulphate of potash	.170
Sulphate of soda	1.013
Chloride of sodium	.304
Silica	.056
Moisture and loss	.593
	6.884

The amount of free carbonic acid was not estimated.

Although the sulphate of magnesia (Epsom salt) is the principal saline ingredient of these "Epsom Springs," at and near Crab Orchard, the presence of other saline ingredients, and of the carbonate of iron, modifies greatly the action of that well-known salt, so that the medicinal effects from the use of these waters is considerably different from that of a pure solution of sulphate of magnesia, and they are applicable to a greater variety of cases.

The medicinal virtues of the saline matter of the Crab Orchard Springs have been so highly appreciated of late that a large quantity of "Crab Orchard Salts," obtained by evaporating the water to dryness in iron kettles, has been sold by our druggists, and it has become an *officinal* article. Some of these salts, as manufactured by Mr. B. H. Sowder, from the water of "Sowder's Spring," near Crab Orchard, presently to be described, were submitted to chemical examination.

[1] Held in solution by carbonic acid.

11. "Sowder's Spring" (Lincoln County, Ky.).—The *composition* of this water was found in 1000 grains—

	Grains.
Carbonate of lime	0.506[1]
Carbonate of magnesia	.375[1]
Carbonate of iron, a trace.	
Sulphate of magnesia	2.989
Sulphate of lime	1.566
Sulphate of potash	.298
Sulphate of soda	.398
Chloride of sodium	1.000
Silica	.021
Bromine, a trace.	
	7.153

The amount of free carbonic acid was not estimated.

The Crab Orchard salts, procured by evaporating the above water, are composed as follows—

Crab orchard salts—*composition.*

Sulphate of magnesia	63.19
Sulphate of soda	4.20
Sulphate of potash	1.80
Sulphate of lime	2.54
Chloride of sodium	4.77
Carbonate of lime, magnesia, and iron and silica	.89
Bromine, a trace.	
Water of crystallization and loss	22.61
	100.00

12. "Bryant's Spring," No. 1 (Lincoln County, Ky.).—It was found to have the following *composition* in 1000 grains—

Carbonate of lime	0.118[1]
Carbonate of magnesia	.024[1]
Carbonate of iron, with a trace of manganese	.007
Sulphate of magnesia	.027
Sulphate of potash	.010
Chloride of sodium	.088
Silica	.017
	0.291

Free carbonic acid not estimated.

[1] Held in solution by carbonic acid.

13. "BRYANT'S SPRING," No. 2 (Lincoln County, Ky.).—*Composition* in 1000 grains—

	Grains.
Carbonate of lime	0.095[1]
Carbonate of magnesia	.037[1]
Carbonate of iron	.021[1]
Sulphate of lime	.010
Sulphate of magnesia	.070
Sulphate of potash	.026
Chloride of sodium	.015
Silica	.046
	0.320

Free carbonic not estimated.

14. "BRYANT'S SPRING," No. 3.—*Composition* in 1000 grains—

Carbonate of lime	0.093[1]
Carbonate of magnesia	.048[1]
Carbonate of iron, a trace.	
Sulphate of lime, a trace.	
Sulphate of magnesia	.006
Sulphate of potash	.025
Chloride of sodium	.175
Chloride of magnesium	.042
Silica	.015
	0.404

The free *carbonic acid* and *sulphuretted hydrogen* present in the water were not estimated; a weak saline *sulphur water*.

15. "BRYANT'S SPRING," No. 4 (Lincoln County, Ky.).—*Composition* in 1000 grains—

Carbonate of iron, a trace.	
Chloride of sodium	0.933
Sulphate of magnesia	.069
Sulphate of lime	.104
Sulphate of soda	.205
Sulphate of potash	.016
Silica	.015
	1.342

16. "STONE'S SULPHUR SPRING" (Lincoln County, Ky.).—*Composition* in 1000 grains of the water—

Carbonate of lime	0.058
Carbonate of magnesia	.116
Carbonate of iron	.026
Sulphate of lime	.012
Sulphate of magnesia	.023
Sulphate of potash	.007
Chloride of sodium, a trace.	
Silica	.030
	.272

The free *carbonic acid* and *sulphuretted hydrogen* were not estimated.

[1] Held in solution by carbonic acid.

17. "A Well in front of Bryant's House" (Lincoln County, Ky.).—*Composition* in 1000 grains.

	Grains.
Carbonate of lime	0.480[1]
Carbonate of magnesia	.013[1]
Carbonate of iron	.019[1]
Sulphate of magnesia	.904
Sulphate of lime	.966
Sulphate of potash	.066
Sulphate of soda	0.028
Chloride of sodium	.278
Silica	.090
	2.844

The amount of free carbonic acid in this water was not estimated.

The Jerks, or, as it has been called, Epidemic Epilepsy.—In this account of epidemics, I shall begin with the first, so far as I know, and certainly the most remarkable epidemic which has visited the State of Kentucky; remarkable alike for the extent of country overrun, the number of persons affected, and the strangeness of the phenomena exhibited. I allude to a number of affections which were, at the time, called "bodily exercises," and which attended a great religious excitement from 1799 to 1805. The propriety of introducing a history of these affections into a history of epidemics, may very properly be questioned by many; but it seems to me by no means inappropriate, because it manifested all the characteristics of an epidemic, if we except "a peculiar *constitutio æris*." Whether or not that was present, or if present, what were its properties, we are as ignorant as we are of the same facts in any other epidemic. The history of these things, too, is equally interesting to the physician and psychologist.

For the following account of these strange affections, we are indebted to the *History of the Presbyterian Church in Kentucky*, by the Rev. Robert Davidson, who had collected the facts detailed by many writers who were personally connected with them, and who differed widely among themselves as to the character and causes of these affections. Among these writers, I may mention McGready, McKee, Hodge, Stuart, McNamar, Cleland, Marshall, Stone, and especially Rice and Lyle.

History.—During the years 1797–98, considerable interest upon the subject of religion was excited in that region of country em-

[1] Held in solution by carbonic acid.

bracing the southern portion of Kentucky, and northern part of Tennessee, then called the Green River Settlements. This excitement was temporary, but was renewed in 1799, in a very remarkable degree. In the summer of that year, at a sacramental meeting in a Presbyterian congregation on Red River, the public services were animated, and tears flowed freely; but nothing special was observed until Monday morning. Whilst Mr. Hodge was preaching, a woman in the extreme end of the house, unable to control the violence of her emotions, gave vent to them in loud cries. At the close of the morning service, the people showed no disposition to leave their seats, but wept in silence all over the house. Such was the state of things when Mr. McGee, a Methodist minister, arose to speak. Too much overcome by his feelings to preach, he expressed his convictions that a greater than he was preaching; and exhorted the people "to let the Lord God Omnipotent reign in their hearts." Upon this, many broke silence, and the vociferations of the woman above mentioned were tremendous. The minister, after a brief debate in his own mind, considered it his duty to disregard the usual orderly habits of the denomination, and passed along the aisle shouting and exhorting vehemently. The clamor and confusion were now increased tenfold; the flame was blown to its height; screams for mercy were mixed with shouts of ecstasy, and a universal agitation pervaded the whole multitude, who were bowed before it as a field of grain before the wind. Now followed prayer and exhortation; and the ministers found their strength taxed to the utmost to keep pace with the demands of this intense excitement.

Thus commenced the "*bodily exercises*," or, as they were familiarly called, "jerks," from the most common form in which they appeared, which spread like wildfire through Kentucky, Ohio, Tennessee, and into the Carolinas.

The excitement was so great, that the young and old, the male and female, the industrious and the lazy, the religious and the profligate, neglected all ordinary duties and went thirty, forty, fifty, nay, hundreds of miles to attend these "sacraments," as they were called. Of course, in a sparsely settled country, no accommodations could be found for such multitudes. Hence the origin of camp-meetings, of which we will speak hereafter. This excitement may be said to have reached its height in 1801, when, between May and August, six camp-meetings were held, varying in duration from four days to a week. From this time there was an abatement of this epidemic, for a few years gradual, subsequently more marked;

but I understand that in some sections of the country sporadic cases continue to be occasionally observed.

In undertaking to give the causes of this strange affection, I feel that much must be left to conjecture; and I shall not be at all surprised if the attempt shall be judged unsuccessful. Many persons considered that all the forms of jerks were occasioned by a direct influence of the Holy Spirit, and some enjoyed very comfortable reflections in consequence; supposing themselves, or their friends, peculiarly favored of heaven. Although many, especially of those affected at the beginning of the epidemic, gave, through their subsequent lives, a very satisfactory evidence of a Christian life, yet there were too many instances, which even at the time and afterwards, exhibited feelings utterly inconsistent with holiness, or even decent deportment, to allow for a moment of such a solution. We cannot conceive that the Spirit of God working *in a man* would be directly opposed to the same Spirit speaking *in the Word:* that that Spirit which requires all things to be done "decently and in order," would give rise to the most disorderly conduct and to the utmost confusion.

Others believed that these exercises were from Satanic influence. But we are again met by the same inconsistencies and incompatibilities. There seems to be no doubt that many thus affected were really converted to God, as their after life testified. This, of course, would be inconsistent with the plans of Satan. The course of symptoms, also, were entirely inconsistent with any of that gentleman's desires; as they are not known to give rise to poignant convictions of sin and piercing cries for mercy.

Again, they were ascribed to deception. This is decidedly negatived by the fact that many of the actions were performed with a celerity which it was almost impossible to conceive, much less execute by the power of the will. Again, nothing could exceed the vexation and mortification felt by numbers who found themselves unable to restrain the various "exercises" which, in their own eyes, were supremely ridiculous. The scoffer, the persecutor, the blasphemer, the infidel—no less than the devotee, who sincerely strove to be quiet; who braced themselves up with premeditated resolution, or treated the work as a delusion, were seized with paroxysms which they could not prevent.

To enable us to form an estimate of the causes of these excitements, we must look into the previous state of society, and the customs of the people. By recurring to the earlier history, we see

that there had been a long period of border warfare; that a large portion of the time of the settlers had been occupied in defending themselves against the savage foe, and in carrying on hostile invasions of the Indian towns; that they were not only an excitable people, but actually in an almost continual excitement. This state of things necessarily gave rise to a neglect, or at least a non-observance, of church services, and an utter impossibility of enforcing church discipline. Accompanying this, was necessarily a deficiency of family religion, and proper training of the young. The people, too, were decidedly unfriendly to the administrations of Gen. Washington, and of the elder Adams, and were enthusiastic admirers of the French nation, indeed, of everything French. Hence, the door for the reception of French infidelity was most invitingly open, and God knows, the supply was abundant.

By the defeat of the Indians, in 1794, by Gen. Wayne, the power and spirits of the savages were so much broken, that they were willing to make peace, and thenceforth, there was no danger from them; and an immense flood of immigrants set in towards Kentucky, allured by the prospect of making large fortunes, by appropriating great quantities of her rich lands. Thus was introduced into the character of our people the element of cupidity, which before had scarcely been recognized. Contemporaneous with this influx, came a number of clergymen, many of whom seem to have been well qualified to make an impression upon the population then inhabiting the country. Struck with the very marked difference which characterized the habits of this people from those of the people whence they had come, they could not avoid being impressed with the necessity of arresting the profane and demoralizing habits of the people, as well as the irreligious and infidel influences which were so extensively at work in the country.

Many of these ministers, like their antecedent settlers, were characterized by an indomitable courage in their line, and powers of mind fitted to meet and overcome difficulties. It may not be amiss to record some of the striking characteristics of a few of them.

1. Lewis Craig (Baptist) was not a man of cultivated mind, but of sound sense, agreeable manners, a musical voice, and impassioned delivery. He and others had been arrested in the yard of the meeting-house (near Fredericksburg, Va.), and carried before the court. "May it please your worship," said the sheriff, "they cannot meet a man on the road, but they must ram a text of Scripture

down his throat." As they refused to abstain from preaching, they were sent to jail for a month. They marched through the streets to prison singing "Broad is the road that leads to death!" Craig continued to preach to great crowds through the iron grates, with much effect.

2. Elijah Craig, his brother, of considerable natural talents, and of inextinguishable zeal.

3. Robert Marshall (Presbyterian) was clear, logical, systematic, and adhered closely to his text. Was of a coarse, strong mind, and impetuous in his temper. He delighted in startling expressions, and in language calculated to rouse and impress an audience. Preaching once to believers, he said, "Go away, *sinners*, I have nothing for you." Being at another time persuaded to try a milder strain than was his wont, he delivered a most delightful, comfortable sermon, suited to encourage the timid, and not overwhelm them. His hearers were softened and enraptured. But at the close of his sermon, he could not resist his old propensity, and threw his audience into a panic, by exclaiming, in his awful way—"And now, ye *hypocrites*, *you* will be snatching at the *children's* bread!"

4. Carey H. Allen. His disposition, naturally gay and volatile, was somewhat modified by his conversion, but never entirely subdued. He was a mirthful, fun-loving, pleasant companion, and a great wit and satirist. Sanguine and impulsive, his sallies partook occasionally of no little eccentricity; yet he would say the oddest things, and take the boldest flights, with such an easy and natural air, that no one felt his sense of propriety shocked. On his way to Kentucky, he put up for the night at a house where the young people of the neighborhood had assembled for a dance. The handsome stranger was invited to join them, and no denial would be taken. At length, he suffered himself to be led to the floor, and to have a partner assigned him—when, all at once, he called to the musician, "Stop! I am always in the habit," said he, "when I enter upon any business to which I am unaccustomed, first to ask the blessing of God upon it. Now, as I find myself in new and unexpected circumstances, I beg permission to implore the Divine direction in the matter." Suiting the action to the word, he fell upon his knees and poured forth a prayer in his characteristic, impassioned manner; then, springing to his feet, he followed the prayer by a powerful and eloquent exhortation. His delivery was in the highest degree natural and impressive. He once commenced the recital of a well-known hymn, "To arms! To arms!" with such

a life-like tone, that many believed there was an alarm of Indians —nothing to be wondered at in those days.

5. John Lyle was of moderate talents, but studious, of sound judgment, and methodical. In the pulpit, he possessed, in an uncommon degree, the power of unlocking the fountains of feeling, and awaking a sympathetic interest in the bosom of his auditors.

6. James McGready was one of the Sons of Thunder, a Boanerges, in both matter and manner, and an uncompromising reprover of sin in every shape. The curses of the law lost none of their severity in falling from his lips, and, like Mirabeau, the fierceness of his invectives derived additional terror from the hideousness of his visage, and the thunder of his tones.

It is not at all surprising that earnest, zealous ministers of the cross, finding the desolation of Zion then existing, should feel themselves called upon to exert every faculty with which they had been blessed, to repair the waste places. Neither is it strange that an ingenuous, excitable, and enthusiastic people, should respond to such appeals and such eloquence as were addressed to them. Perhaps the foregoing considerations are sufficient to account for the commencement of the excitement; but after it was begun, there is little reason to doubt that the quick succession of "camp-meetings" was a most powerful cause in aggravating it and causing it to spread far and wide. We have mentioned how it commenced in the "Cumberland Settlements." The first regular camp-meeting was held near Gasper River Church, in July, 1800. Mr. McGready had taken great pains to spread the information previous to the time appointed, that he expected the people to come prepared to encamp on the ground, and the whole country, and ministers especially, were earnestly invited to attend, and witness the wonderful scene that was anticipated. During the year 1800, ten "sacraments," as these meetings were called, were held in the Green River and Cumberland River settlements—all very much of the same character.

We have said that, in a sparsely settled country,[1] it was impossible to find accommodations for the vast number of persons who attended these sacraments. To explain how they were accommodated; and, at the same time, for the purpose of giving some idea of these assemblages, to those who may never have seen a camp-meeting—and especially a Kentucky camp-meeting—we will de-

[1] The whole population of Kentucky was 221,000.

scribe one, having in our eye that one which was held at Cane Ridge, in 1801. A suitable piece of ground—one gently sloping —was selected, and on a given day, the whole country, for five or ten miles round, assembled on the spot designated. All the timber was cut off an area of some two or three hundred yards, by one hundred and fifty or two hundred. Of this space, a large portion was covered with seats of roughly-hewn logs, with suitable aisles. Over these seats, supported by posts some 12 or 15 feet high, a roof of clapboards was erected, as a protection against sun or rain. At the lower end, the "stand," or pulpit, was constructed, of the same materials as the seats, with a rough hand rail around three sides of it. The adjoining ground was laid off in regular streets, along which were constructed rough cabins, made of the bodies of small trees, and covered with clapboards.

Upon the day appointed for the "sacrament" to commence, the concourse began at an early hour. Those who arrived first, had choice of tents, as long as there was a choice. Those who arrived later were forced to sleep in their wagons, or in tents brought for the purpose. The concourse at Cane Ridge was prodigious, being estimated by a revolutionary officer present, who was accustomed to estimate encampments, to amount to not less than 20,000 souls. One of the elders estimated that there were 1,100 communicants present; another said 800. Some pains-taking persons counted 143 carriages and wagons, 500 covered sleighs, and 500 without covers; and 500 candles, besides lamps, to illuminate the camp at night.

The religious duties may be said to have been kept up day and night, as they commenced at sunrise and usually closed at from two to four o'clock in the morning; but what particular part of worship (as singing, praying, &c.), or how many of these parts might be going on at any particular time, was impossible to tell; for it was not unusual for preaching, praying, singing, exhorting, jerking, &c., to be going on in close proximity at the same time. Neither was there any concert among those engaged in any one of those duties. In the church at Providence, Mr. Lyle observed six different hymns sung at the same time. What made the matter worse was that every one sang at the top of his voice, and very many with violent contortions of the body. So in everything else. There was no fixed time for anything. Each family cooked and ate the provisions, which they had brought in great profusion, at such times as suited their own convenience. Everybody was

invited to partake. During the most pathetic appeals men would wrap themselves in their great coats and lie down to sleep.

At these "sacraments" were collected a vast number of the elements necessary to make an overwhelming impression upon the nervous system. The spectacle presented at night was one of the wildest grandeur. The glare of the blazing camp-fires, and numerous lamps, falling on a dense assemblage of heads, simultaneously bowed in adoration, and reflected back from long ranges of tents on every side; hundreds of lamps and candles suspended among the trees; together with numerous torches flashing to and fro, throwing an uncertain light on the tremulous foliage, and giving an appearance of dim and indefinite extent to the depth of the forest; the solemn chanting of hymns, swelling and falling on the night wind; the impassioned exhortations; the earnest prayers; the sobs, shrieks, or shouts, bursting from persons under intense feelings of mind; the sudden spasms which seized upon scores, and suddenly and unexpectedly cast them to the earth—all conspired to invest the scene with terrific interest, and to work up the feelings to the highest pitch of excitement. Add to this the eagerness of curiosity, stimulated for so long a time previously—the reverent enthusiasm by which many ascribed the strange contortions to the mysterious agency of God—the fervent and sanguine temper of some of the preachers—and, lastly, the boiling zeal of the Methodists, who could not refrain from shouting aloud during sermon, and afterwards shaking hands all around, in what Mr. Lyle called "a singing ecstasy," and who did all in their power to add fuel to the fire. Nor must it be omitted that these excitements, in the first instances, ensued immediately on the delivery of pungent, and stimulating preaching or exhortation—take all these into consideration, and we shall scarcely be surprised at any extravagances of an excitable people. Such, we think, were the causes of these strange manifestations.

Persons liable.—The old and the young, the grave and the gay, the white and black, the male and the female, the pious and dissolute, the Methodist and the Quaker, were liable to the disease. We have no means of knowing the relative degree of liability; though the general impression is, that there was little difference. Of those who *fell* at Cane Ridge on one day nearly all were men. Very probably different classes preponderated at different times. If we could rely upon our own observation when a boy, and on our memory for half a century, we would say that a considerable ma-

jority were females. From our views of the causes, we would suppose that those of an irritable, excitable nervous system would be more liable, the more especially after a day or two's attendance at one of these exciting encampments. As to age, McNamar says, that at a meeting at Concord, there were evident subjects of this marvellous operation, even from the age of *eighteen months* to sixty years. There is evidently some *poetry* in this statement. More, indeed, than we should expect in a minister, notwithstanding his strong sympathies for these extravagances. But Lyle, who was as decidedly opposed to them, gives several instances of children of seven, eight, nine years, and upwards, who, when they "got deliverance," as the phrase was, exhorted with singular precocity of eloquence and pathos. Two girls of nine and ten years, at a sacrament near Flemingsburg, were in great distress. One of them received comfort, when she began to exhort her young friend until she, too, "got deliverance;" then taking her in her arms, exclaimed, "Oh! here is another star of light." At Indian Creek, in Ohio, a boy twelve years old was exhorting with great earnestness, when, raising his hand, and letting fall his handkerchief, wet with tears and perspiration, exclaimed, "Thus, O sinner, will you sink into hell, unless you forsake your sins and turn unto the Lord!"

Symptoms, or Phenomena.—We shall include under seven heads, what we have to say of symptoms. These are, 1. The Falling Exercise. 2. The Jerking Exercise, or the Jerks. 3. The Rolling Exercise. 4. The Running Exercise. 5. The Dancing Exercise. 6. The Barking Exercise; and 7. Visions and Trances. We might extend the list greatly; but these will give a sufficient idea of the extravagances of the times.

1. The Falling Exercise. Preceding the invasion of a paroxysm, many had a sense of numbness, and suddenly found themselves unable to move. Others had a sensation of the pricking of needles. Others were seized with a universal tremor, and instantly fell shrieking. In general, there was no sensation of pain, but of extreme weakness, before the attack. And many fell suddenly, as if they had been shot, without premonition of any kind. In this condition, the subject would lie from fifteen minutes to two or three hours; and a case is mentioned in which a woman lay nine days and nights without eating or speaking. Some were more or less convulsed, and wrought hard in frightful nervous agonies, the eyes rolling wildly: but the greater number lay quite motionless, as if about to expire; some were capable of conversing,

others not. The hands were cold, accompanied generally with a weak, low pulse, sometimes difficult to be felt, because of a subsultus tendinum. Sometimes the pulse was fuller and quicker than usual. A woman who had been exhausted by exhorting a long time, had the veins of her neck much swelled. Another who played a frequent and conspicuous part in these exercises, had her breast much swollen. The face was sometimes pale, sometimes flushed, sometimes a pale yellow, or of a corpse-like hue. The breathing was hard and quick, even to gasping. The limbs were rarely cramped.

In the hysterical, or convulsed state, there was frequently a kicking or drumming of the heels against the floor, so as to be heard at a considerable distance. Sometimes a convulsive bouncing on the floor, to make a loud noise; sometimes a prancing over the benches before falling.

During the syncope, and, indeed, when conscious and conversing, the subject was frequently insensible to pain. Mr. Lyle applied a vial of hartshorn to the nose of a stout young man, lying flat on his back, and inadvertently let some of it run into his nostrils; but he took not the slightest notice of it. Neither did such as fell, or were tumbled over against a stump or a tree, sustain any injury.

The number affected in this singular manner was astonishing. At Cabin Creek, May, 1801, so many fell on the third night, that, to prevent their being trampled on, they were collected together, and laid out in order, in two squares of the meeting-house, covering the floor like so many corpses. At Paint Creek, 200 are supposed to have fallen. At Pleasant Point, 300; but these accounts are beggared by the great meeting at Cane Ridge, Aug. 1801, when 3,000 were computed to have fallen.

2. The Jerking Exercise, or, as it was familiarly called, the Jerks, was the most common, as well as the most remarkable form of these remarkable manifestations. They first appeared at a sacrament in East Tennessee, where several hundred of both sexes were seized with this strange affection. They soon became so common, and marked by such strongly-marked motions, as to give the generic name to all these extravagances. Their first and most simple appearance consisted in quick and violent motions of the forearms, so strongly marked as to agitate the whole body violently. At other times, the muscles of the neck would be principally affected, and the head would be jerked right and left, with a force and velocity perfectly inconceivable; no feature could be distinguished, and

the violence of the motions was so great as to create serious apprehensions that the neck would be broken. At the first twitch, the headdresses and combs of females would be thrown to a distance, and when the hair was long, it would snap and crack like a whip. This may seem to some incredible, but numbers, now alive, were old enough then to mark and remember the fact. At times, the muscles of the back would be affected, and then the subject would be thrown violently to the ground, and suffer the most violent contortions, graphically compared to the fluttering of a fish when thrown upon the ground. Again, the muscles of the whole body would be affected, and the person would be jerked to and fro, in all directions. All control of the muscles was lost, and he must necessarily go as he was driven, whether it was in a violent dash on the ground, or to hop round with head, limbs, and trunk jerking in every direction, as if they must inevitably fly asunder. The bosom would heave violently, and the countenance become disgustingly distorted. The *Jerks* continued longer than any other of the forms of this disease, and also, persons remained affected by them longer. Lorenzo Dow saw 150 exercised in this way at Knoxville, Tenn., in 1805, and Dr. Cleland saw a young woman who had been subject to them for three years.

3. The Rolling Exercise was specifically noticed by McNemar as a distinct variety. It consisted in being violently prostrated and doubled, with the head and feet together, and rolling over and over, like a wheel; or in turning over and over sidewise, like a log.

4. The Running Exercise. In this, the subject took a sudden start, and felt impelled to run at his greatest speed, as if engaged in a race, leaping over obstacles in his way, with surprising agility. This was continued until his strength was completely exhausted, when he fell down in a syncope.

5. The Dancing Exercise. This was not one of the original forms, but came in during the progress of the "*New Lights.*" At the spring at Turtle Creek, in 1804, about six months after those in favor of these "New Measures" had separated from those who adhered to the quiet and orderly mode of public worship, and had received the name of "*New Lights,*" Mr. Thompson, at the close of the meeting, felt himself impelled "to go to dancing," and continued this movement around the stand, in a regular manner for an hour or more, repeating in a low voice, all the time, "This is the Holy Ghost! Glory!" This did not become common among his fol-

lowers until the next winter, when they encouraged each other "to praise God in the dance!"

6. The Barking Exercise, like dancing, came in later in the epidemic. It consisted in the subject getting down on his hands and feet, and barking, snapping, and growling in a degree so natural as to deceive the unwary, unless they had their eyes directed to the spot whence the sounds proceeded. It may be difficult, in ordinary times, to conceive how decent, respectable men could be induced to go through these extravagances; and it certainly looked strangely enough to see it done with the utmost solemnity. It would seem that no man could command his countenance, when he would hear these ejaculations interspersed with texts of Scripture: as, "Every knee shall bow—wow—wow; and every tongue shall confess:" and yet we are assured that one of the effects was, to overawe the wicked, and to excite fearful apprehensions in the minds of the impious. These *barks* at first were looked upon as signs of guilt, and as a punishment for sins, or for disobedience in refraining from some one or other of the *exercises* to which the subject had been impelled, but which he had successfully resisted—hence many found relief by engaging in the "dance"—but they soon came to be considered as evidences of special favor. Neither was this exercise confined to persons in the humbler walks of life; but persons of cultivated minds and polite manners found themselves involuntarily reduced to this mortifying situation.

7. Visions and Trances. At an early period, it was observed that those who had been subject to syncope or swooning, would, upon recovering, detail visions which they had seen, and sing "in the strains of heaven," and discourse and exhort in a style far beyond what was supposed to be their ability. These visions were of every possible description, from the most pleasant and rapturous to the most appalling. It is not necessary to go into specifications.

We have said that these "exercises" were not the result of deceit or imposture. Of the correctness of this opinion very many instances gave ample testimony. We will mention a few. Polly McB—— was unconscious of any change, and was surprised to see people flocking around her, till, making an exertion to move, she found herself powerless. One D—— dropped as if shot, just after expressing his fears that the work was not all right. One M—— threatened his swooning daughters that he would beat them if they ever came to such a place again. One H——, of Stoner, defied God and his angels to throw him down, but it was an idle boast.

But whilst entirely satisfied that there was no intention to practise imposition, there is ample reason to believe that very many too readily yielded themselves slaves to the influence of a heated imagination. A considerable proportion of the clergy, though struck with astonishment, and not knowing at first what to think of what they saw, yet soon saw the evils likely to grow out of these extravagances, and early exerted themselves to suppress, or at least to restrain them. These clergymen, although they were unable to keep the infection out of their congregations, were comparatively little troubled with its effects. Dr. Blythe cured a lady of his congregation by threatening to have her carried out of the congregation at the next repetition. Yet Dr. Blythe himself, at one time, was satisfied that, through sympathy, he felt an approaching paroxysm; and it was only by a continued determination that he was able to ward it off.

When the paroxysm had come on, and the will was powerless to arrest it, occasionally the subject could substitute other actions for the form with which he had been seized. Thus those who were invaded by the "*barking exercise*" were usually able to change it into "*dancing!*" A young gentleman, the son of an elder, being unwilling to go to meeting one Sabbath morning, feigned sickness and went to bed, where he lay until all the family, except some negro children, had gone to church. While lying there, he began to think about the scenes so often enacted at the meetings, when he was suddenly "jerked" out of bed, and thrown to different parts of the room. Reflecting that persons thus exercised were frequently able to dispel the paroxysm by engaging in prayer, he essayed that mode of relief, which, to his great joy, he found successful. His exertions, however, had fatigued him somewhat, and he lay down again. In a little while he was again jerked out of bed and about the room. He again had resort to prayer, which was again effectual. He then concluded to go into the tanyard, and employ himself as a means of protection against the jerks. He had succeeded so far as to put a hide across the brake, and had taken the knife in his hand ready to begin his operations, when the knife was suddenly flirted out of his hand to a considerable distance, and himself hurried backwards over logs and against the fence. Gaining relief by his former remedy, he ventured to renew his operations; when the same effects were repeated. Finding his talisman losing its effects, he now became seriously alarmed, and betook himself more earnestly to prayer. In this condition, weep-

ing and crying to God for mercy, he was found by the family on their return.

Again, a strong and solemn impression, made upon the mind by others, would sometimes arrest the most violent agitations, *e. g.* At the Walnut Hill Sacrament, in September, 1801, when the house was crowded to suffocation; when some were singing, some praying, some shouting, some jerking; "Father Rice" arose in the pulpit, with his commanding form, his silver locks, and in the most solemn and impressive manner, began to repeat, "HOLY! HOLY! HOLY IS THE LORD GOD ALMIGHTY!" Never was there anything more impressive. There was an instantaneous silence in the whole house.

The remedy then was a determined and systematic attempt to discourage all tendencies to noise or disorder in any shape. This duty, of course, fell upon ministers and the most influential members of the several congregations. This course a large majority of the Presbyterian clergymen early adopted. Two parties, "The Revival Men" and "The Anti-Revival Men" were soon formed, and of course those styled "Anti-Revival" were charged with obstructing God's work; with being opposed to true religion; with being atheists in disguise. Notwithstanding they felt their influence waning; although they were occasionally treated with indignity; although publicly charged with being enemies to God, they persevered. It was reserved for Mr. Lyle—who had closely and anxiously watched the whole course of the excitement, and who had been, more than once, grossly insulted for his conservative course—to make the first successful stand against disorder. This was done at Walnut Hill, September, 1803, in a sermon "On Order," prepared with a great deal of care, and delivered under a full sense of his duty, as also of the unpleasant consequences which might result to himself. The effect greatly exceeded his hopes, and the meeting was conducted with a very tolerable degree of decorum. The success of this attempt emboldened others to hope for better things, and the evil began gradually to abate.

For the following account of Milk Sickness, or Sick Stomach, which is by some considered a disease *sui generis*, we are indebted to Dr. Jas. H. Barbour, of Falmouth, Ky.

MILK SICKNESS, *alias* MALIGNANT FEVER.—The object of this paper is to give a brief history of an epidemic that prevailed in the town and vicinity of Falmouth, during the fall and early winter of

1854, and 1856; also to state the facts that convinced me that the disease known by many physicians, and the common people at large, by the name of milk sickness, is clearly a congestive or malignant remittent, in which the stages are so blended from the beginning, or become so during its course, as to assume the appearance of continued fever.

The town of Falmouth is situated in north latitude 38° 40′, and at an elevation of 560 feet above the sea. The town is situated at the confluence of Main and South Licking Rivers, on an alluvial bottom of about three miles in circumference, and generally above the extreme floods of the rivers which nearly surround it. The valley of the South Licking, at the foot of which the town stands, is of an average width of more than a mile, generally level, and yet so well drained that there are but few swamps and but little stagnant water. The bottoms of the Main Licking, with but few exceptions, are narrower, higher, and dryer, than those of the South Licking. The streams are generally tortuous in their course, and the smaller ones much interrupted by the growths of willow, hazel, &c., along their beds. The surrounding country is ridgy, and the prevailing growth of timber oak, which gives way as you approach the streams, to growths indicating a deep rich soil. The blue, shell, or lower silurian limestone, underlies the whole country.

The summer and fall of 1854 were unprecedented in the history of this country for the intensity of the heat, and severity of the drought. The creeks and smaller watercourses were entirely dry, exposing their beds to the action of the sun, parching and killing the water-loving growths that ordinarily mark their course with lines of verdure. The water in the larger creeks and rivers became so low as to expose flats and bars, with their accumulated silt, which had not been so exposed for years. The drought of 1854 was repeated in 1856, but the heat was not so intense.

The health of Falmouth and vicinity, during the early and middle summer, was good, and not until the latter part of August did we have any intimation of the epidemic that was to follow. About this time we had the first rain that had fallen since June, and that in very light showers. Owing to the great heat and dryness of the ground, the moisture was either absorbed or driven off in vapor immediately after falling.

The first cases of disease that were presented were distinct intermittent. As the season advanced, and the showers were repeated, inflammatory remittent made its appearance. By the 20th of Sep-

tember, the epidemic began to assume a graver form, which gradually progressed from the open intermittent and remittent fevers above named, until by the first of October, cases were beginning to assume the continued form (which I shall call malignant) hereafter to be described. Cases of this type increased in frequency and severity during the months of October and November, falling off in number, but not much in severity, during the month of December, the epidemic closing with the latter month. Where intermittent and remittent prevailed most during the early part of the epidemic, there the malignant was found the severest during the latter; often intermittent, remittent, and malignant were found in the same family, and the same neighborhood, at the same time.

During the progress of the epidemic, there were 25 cases of the malignant type, being one-third of the whole number of cases; the rest were distinct intermittent and remittent. Of the 25 cases, 21 were males and 4 females; all were of adult age, or nearly so. Twenty-two of the cases were along the creeks and rivers, only three on the tops of the ridges. In the milder forms of the epidemic, females bore a larger proportion to the males than in the above; children were entirely exempt from the malignant form, but not entirely from the milder.

Symptoms.—During the first stages, they differ but little from those of ordinary remittent. Frequently the patient complains first of muscular soreness, with aching of the limbs and back, of inability or indisposition to take the ordinary exercise. More or less headache, with a sense of heaviness or fulness. These symptoms may be accompanied from the first, or followed in a few days, with slight rigors, irregular in their action; or there may be distinct chills for one, two, or three days, followed by marked reaction. On the other hand, the rigors may be so slight, if at all, as to escape detection.

Loss of appetite. The tongue is usually coated with a heavy tenacious fur, white or yellow, which bristles out from the surface like the nap on plush. The tongue is often red at the tips and edges; during the progress of the disease, it often becomes dry, and in bad cases brown or black. At first, there is only a sense of oppression at the stomach; burning, nausea and vomiting soon follow. There is always a high degree of gastric irritation, accompanied with much burning and great thirst. The nausea is almost constant, unless there is a slight respite after vomiting. Vomiting in some cases is at regular periods, every twenty or thirty minutes; in

others it is not so regular. The stomach generally will not bear the slightest accumulation of fluid. If the patient drinks water, or other fluids (unless it is ice water), he vomits often; if the fluid vomited has to be supplied by the secretions, not so often, but the burning is greater. The fluid vomited has the appearance of water stained bright-green, or in some cases of a bluish-green. The quantity of fluid vomited is usually very large, at first, diminishing as the case progresses, if dependent upon the secretions alone. The bowels are constipated from the first, and often most obstinately so, requiring very active means to unload them. The pulse in a large majority of cases was small, and depressed in frequency; in a few, moderately increased. The respiration is somewhat hurried, without depth, and accompanied with frequent sighing.

The drowsiness, or partial stupor of the early stages, in severe cases, passes into deep coma, the pupils much dilated. In all cases there is much restlessness, which is not prevented by the stupor or coma. The face has a red and bloated appearance, or a stupid dusky one, at the same time nose and ears cool. The surface over the chest and face is usually but little elevated in temperature, while the extremities are cool or cold. At the same time, the patient complains of a sensation of acrid or burning heat.

I will now give the history of three cases as I find them in my notes. The first is a mild case. The second a severe one, that recovered. The third a fatal one.

Case I.—On the 8th day of October, 1854, I was called to see Mr. S——, age 30, a German by birth, but had resided in this country fifteen years. He was of temperate habits, and, as he informed me, had abstained from the use of milk, butter, or beef. Mr. S—— had been complaining of weakness and aching of the head, back, and limbs for some days; during this time there was some chilliness. I found the pulse 56 to the minute, and small; respiration hurried, somewhat irregular, with sighing; a sense of burning at the stomach. Nausea and vomiting at periods of twenty-five or thirty minutes during the day and night; fluid vomited of bright green color; bowels quite obstinately constipated; tongue coated with a white bristling fur. There was a constant desire to drink, although the stomach would almost immediately reject it. There was headache; dilated pupil; slight delirium and restlessness; the extremities cool; but the patient complained of their burning. This condition continued up to the 13th. After the

bowels had been fully unloaded, the symptoms began to abate. Upon the 16th I discontinued my visits.

Two patients in the same family were taken with chills; the chill was followed with open fever, and that with sweating. After the third chill, they passed into precisely the same condition of the above case, run the same course, and recovered, quinine not having been used to prevent the *chill.*

CASE II.—*November* 4. I was called to see Mr. W——, age 42, robust, of good habits. I found him with a bloated, stupid look; pulse 60; respiration oppressed and defective; frequent sighing. His tongue coated with a close white fur, being uniform and deep, and standing out like the nap on plush; loss of appetite; headache; pain in the limbs and back; there was a sense of heaviness at the stomach, and some nausea. During the formative stage of the disease there was irregular chilly sensations.

6th. Bowels have not been moved; pulse 58 to the minute; tongue disposed to dry, red at tip and edges; burning sensation at the stomach very severe; nausea constant, and frequent vomiting; insatiable thirst; difficult to get the stomach to retain medicine. The patient vomits; calls for water and drinks, and in a few minutes vomits it up. The fluid thrown up is of a bright-green color; the constipation obstinate; bowels could not be moved until the fourth day, and then required constant care to keep them open. The stupor which was manifested at first, increased, and was accompanied with muttering delirium during sleep, as early as the third or fourth day. The patient, when aroused by his friends, or by the burning thirst, nausea or vomiting, with difficulty recovered his wandering fancy. The pupils were dilated. The forehead was quite warm, and the skin dry; the chest slightly less so; the extremities cold; yet the patient complained of a burning heat in the soles of the feet and palms of the hands. The restlessness in this case became extreme; the sighing respiration, the complaining of burning at the stomach, the crying for water, the frequent vomiting, delirium, &c., prevented repose. The violence of the symptoms continued up to the eighth day, when the burning, nausea, and vomiting began to abate, the pulse slowly to rise, and the patient recovered. I omitted to mention, that during the progress of the fever, the tongue became dry and brown, the lips parched, &c.

CASE III.—*Nov.* 27. Was called to see Mr. J——, age 24, of good constitution, and regular habits. I found him able to be about the room; he had the look of a man just recovering from a

debauch; pulse 54, and gave but a slight impression to the finger; bowels constipated; burning, nausea and vomiting; loss of appetite, and thirst. The tongue was heavily coated with a white bristling fur. *29th.* The symptoms are all aggravated; he can give no intelligent answers to questions relative to his condition. Pulse still further depressed; respiration heavy and sighing. Headache and pain in the limbs; pupils dilated; muttering delirium, which rapidly passed into a profound stupor, from which the patient could not be aroused. There was a sense of falling, and begging to be lifted up; the lifting gave no relief; the patient was not conscious of it. So great was the enervation from the first, that the skin could not be vesicated, and the most powerful diffusive stimulants had no effect. The extremities were cold. The appearance of the face would lead you to expect a hot surface; it was not so, the nose and ears were cold. When the coma had become complete, there was some puffing of the cheeks during expiration. Thirst and vomiting were not entirely interrupted by this condition; the bowels gave way towards the close of the case. Terminated fatally on the eighth day.

The summer and fall of 1856, as has been stated, resembled that of 1854; the heat was not so intense. As might be expected, we had a similar visitation, yet much milder; the cases were fewer in number, and not so severe. Out of 12 cases, 2 proved fatal; 1 was seen too late to render any service, the other obstinately refused to take medicine, and I abandoned it. Of the 12 cases, 8 were males, and 4 females, all adult but one, and she twelve years old. The symptoms were precisely those that I have enumerated in their classes. In the milder cases, the pulse was slightly increased in frequency, and the surface more generally warm.

During the fall of 1854, two of the patients, after convalescence had apparently began, were seized with severe spasms, proving suddenly fatal in one case, the other recovering under the use of antispasmodics and stimulants. During the fall of 1856, the same thing occurred, after apparent convalescence following in the severe cases of the fever, both recovering under the use of antispasmodics, &c.

Treatment.—The first object to be accomplished is to overcome the constipation, and thoroughly unload the bowels; this is best done with vegetable and saline cathartics. My experience has taught me not to use calomel until the bowels have been moved, for, if you do, you are sure to salivate your patient, without any

apparent benefit, only adding to the suffering. After the bowels have been once moved, calomel may be given occasionally, with benefit.

Among the vegetable purgatives, the most prominent are aloes, colocynth, &c. Epsom salts are often effectual in overcoming constipation. If the above remedies do not prove effectual, injections, first of the mild, and then of the more powerful sort, must be used. For the burning and thirst, ice, and ice-water, are the remedies. The ice cools the stomach, allays the thirst, and dilutes the acrid secretions, without producing over-distension; the accumulation of fluid produces vomiting. Iced effervescing draughts are of benefit. Small portions of morphine and soda are often useful in quieting the stomach; also blisters or mustard applied over it; cold to the head when required, warmth to the feet, and friction over the surface with warm salt and water. In bad cases, diffusive stimulants were given, when the stomach would bear them; toast-water, rice, gruel, or broth, was given. Quinine in the formative stage, where there is intermission or remission, has a desired effect; but during the continued form of the fever, it is of no service. The above, in the majority of cases, made up the treatment. Other indications arising, would have to be met with appropriate remedies.

That the above cases were such as are known as milk sickness, there can be no doubt, as all the physicians, having reputation in this disease, pronounced it such, and so did the people, who know it by the smell. (Some of the doctors also make their diagnoses with their nose.) The peculiar smell, about which there is so much said, is the result often of a want of cleanliness and ventilation, when there is much vomiting. I have met with a very similar odor in other fevers, and even in cholera, where there is much vomiting.

Cause.—The cause of milk sickness, like the secret of perpetual motion, has been much sought after, but never found. Stimulated by premiums, those possessing the requisite knowledge have analyzed our waters, minerals, soils, and vegetables, while the ignorant have drugged the calves, but all to no effect.

The theories are very numerous; I shall only name the most common: That the poison is derived from the water in poisonous springs; from mineral, in some way sublimated on the plants; from poisonous plants growing upon grounds that have never been cultivated; from excrescence found upon decaying beech, in old

deadenings, and lastly, from bad air, exuding from sink holes. These are but a few of the popular notions that are substantiated by *positive* observation.

A brief summary of the foregoing facts will show us that the seasons were such as most usually produce the most aggravated forms of malarious disease (great heat and dryness, with the exposure of surfaces usually moist). That there was an unusual amount of malaria present in the atmosphere, showing itself in acknowledged forms, keeping close company, and frequently blending with the malignant fever I have described.

That it prevailed most, if not entirely, in localities favorable to the production of malaria, as the bottoms along the creeks and rivers. One favorite place is a large, flat, and woody bottom, where there has been extensive deadenings, the timber falling and decaying, the ground never having been cleared up. This was a fatal spot to the Irish who live along the railroad passing through it, by a water station swamp; also to cattle pasturing and sleeping there. Another, the banks of a large mill-pond, where low water exposes bars, with accumulated silt, and also decaying drift, stumps, trees, &c. Two families living upon either side of the mill-pond, declare that there are but few seasons that they do not have milk sickness.

That patients suffered that had abstained from milk, butter, and beef. That children, whose food consists in a greater proportion of milk and butter than does that of grown persons, enjoyed an entire immunity from the diseases. I believe, as a rule, they do from the more malignant forms of malarious disease.

(I will state here that typhoid fever—which had prevailed here for years as the standing fever—was entirely abolished by the above epidemic.)

Let me reconcile some of the objections to the malarious origin of milk sickness, or, as I have called it, malignant fever, before I close this article.

1st. That the disease shows itself in the cattle, that the calf may suck it from the cow, that the carrion of such is poisonous to dogs, &c. That cattle may be affected by any concentrated atmospheric poison, is well established. During the prevalence of Asiatic cholera, in some localities, different animals were affected by the disease. In the jungles of India, the malaria, during the sickly season, is so deadly, that bird and beast fly them. Then, it is but reasonable to suppose that cattle, lying on low and wooded grounds, when a concentrated malarious influence was prevailing, might be affected, and

if affected, their secretions or their carrion would be unwholesome. Cattle affected with the disease known as *trembles*, show symptoms of muscular weakness, thirst, constipation, and in fatal cases, the middle stomach shows evidences of inflammation, the contents being hard and dry. (An early unloading of the bowels generally results in a cure.)

2d. After the country becomes opened, the diseases mostly disappear. That applies strictly to malarious diseases.

3d. That milk sickness is found on high and dry ridges, as well as on low grounds, so are all the acknowledged forms of malarious fever throughout Kentucky, and the Mississippi valley generally.

4th. That milk sickness is most prevalent in dry seasons. Most writers on malaria agree that long-continued heat and dryness (other necessary conditions being present) beget the most concentrated poison.

5th. That milk sickness, as a distinct disease, differs widely from all others. I have never met a physician who could make a clear distinction between what he calls milk sickness, and what he calls congestive fever, or what is commonly now known as malignant fever.

I might state and answer objections for pages yet, or discuss questions bearing on the subject, but it would, I fear, be of but little interest to you.

Owing to professional engagements, I have been much interrupted during the writing of this paper. It is hastily and irregularly written; my notes were not as perfect as I could have wished them, yet they present the facts in the case. If this report is of any service to you, I am rewarded.

Yours truly,
JAS. H. BARBOUR.

W. L. SUTTON.

MILK SICKNESS, OR SICK STOMACH. *Topography.*—In most instances, milk sickness is confined to a small section of country. Indeed, the difficulty of determining its location has become proverbial. You may visit a family which you have learned had suffered severely from the disease, and upon inquiring concerning it, you will be told that it is altogether a mistake; they have had nothing of the kind. That if you wish to learn anything concerning it, you must visit some family which resides some three or four miles off, where you will certainly gain the information desired.

When a place is found where it is acknowledged to prevail, it is most commonly an elevated point or hill. Sometimes it is an elevated plateau, more or less covered by a thin stratum of water, which the clayey soil beneath keeps on the surface. Dr. D. D. Owen, State Geologist for Kentucky, has satisfied his own mind that, in every location where he has found milk sickness, there is present, in the soil or rocks, the materials for producing astringent salts. In springs of Hickman County, which had been noted for their deleterious influence, he detected chloride of magnesium and sulphate of alumina and protoxide of iron. In other regions, he found, in milk-sick neighborhoods, the double sulphate of alumina and iron, formed (as he supposed) from the pyritiferous shales; and chloride of magnesium, produced from silico-magnesian earths. In Ohio County, he found sulphate of aluminum and sulphate of protoxide of iron. In Fayette County, he found a silicious rock which, from analysis, gave from 8 to 10 per cent. of alumina and oxide of iron and manganese, also carbonate of lime and of magnesia; but here was no chlorine. In all the spots, in the blue limestone region, affected by the disease, he found the silicious mudstone, or rottenstone. This formation seems to be associated with the transition space between the limestone and the conglomerate—more especially with the shales. The late Prof. Drake, in September, 1840, made patient survey of a district in the State of Ohio, which was noted for the prevalence of this disease. To my mind, his description of the geological formation corresponds with that of Dr. Owen. But I will give his own words. "That part of the Virginia Military District which lies in the angle formed by the junction of the Scioto and Ohio rivers, presents the outcroppings of thick strata of conglomerate, topping the highest hills, and resting upon a fine-grained sandstone; which itself reposes on a bed of soft, gray, friable argillaceous shale, which graduates into a bituminous state. Immediately underneath this, appearing to the northwest of all the rest, is a compact drab-grayish limestone, which stretches across the middle and northern part of the district. Over this formation is everywhere spread a deep bed of diluvial or transported materials, consisting of blue and yellow clay, gravel, and sand." (*West. Jour.*, vol. iii. p. 166.) Dr. Seaton, of Louisville, Kentucky, maintains that, in the *pure* and *thorough* limestone region, there never has been, and never will be milk sickness; but in the regions of impure limestone, limestone mixed with sandstone, or the almost entire sandstone formation, the disease abounds to the greatest extent.

As to the botany of districts where this disease prevails, Dr. Owen thinks it composed largely of plants which have astringent qualities, mentioning especially that, in some localities, oaks of different varieties abound. Dr. Drake tells us that throughout that portion of Ohio which he examined, the table land was heavily timbered with different species of oaks. These table lands, however, were interspersed with wet places, abounding in elm, black walnut, and hickory: with various parasitic plants, among which the *Rhus radicans* predominated. I have not seen Dr. Seaton's pamphlet on milk sickness, but, in a defence of it, he maintains that, in the soils where this disease prevails, the growth must of necessity be as described by Prof. Drake. Thus far these three distinguished gentlemen appear to me to travel the same road, with considerable unanimity; but here we come to the *triviis*, and each takes his own road.

Cause of Trembles, or Milk Sickness in Animals.—Prof. Drake elaborated very extensively the theory that eating the rhus toxicodendron (Radicans) produced the disease in cattle. Dr. Seaton thought that he had conclusively proved that the disease was caused by the presence of arsenic in the sulphuret of iron (pyrites), and introduced by food and drink. Dr. Owen believes that it is emphatically a disease of constipation, occasioned by eating the vegetable products of soils abounding in astringent salts, which enter largely into the vegetable organization; or from drinking water containing these salts in solution. A considerable portion of the physicians and of the people believe each of these hypotheses. Let us examine each one in succession; but, in doing so, let us remember the difficulty inherent in determining the causes of our fevers, cholera, dysentery, &c., and remember that inductions which we consider perfectly legitimate, may appear as unsatisfactory to others, as theirs do to us.

First. We must not understand Prof. Drake as holding that he has demonstrated that the rhus toxicodendron is *the* cause, and the only cause of trembles in animals. His conclusion is best given in his own words. He had proposed six tests to establish the claims of the *rhus* to be the cause, and after examining each, he remarks: "Thus the rhus toxicodendron stands the whole of our proposed tests. Does this, however, prove it to be the cause of trembles? Certainly not; but it shows that this plant *may be* the cause, and renders the popular opinion of the district highly probable."

The tests by which the Professor undertook to try the claims of different plants were six. "1. It must be one which is noxious. 2. It must not be small. 3. It must be acceptable to the taste of cattle, horses, &c. 4. It must be in leaf in autumn, as well as in summer. 5. It must grow abundantly in spots which produce the disease, and sparsely or not all, in the surrounding regions. 6. It must be liable to be destroyed by simply deadening the timber, harrowing the ground, and scattering over it the seeds of any of the grasses." (*West. Journ.*, vol. iii. p. 212—224.) It is certainly true that Prof. D. has adduced a very imposing train of testimony to establish the *rhus* as the cause of trembles. It is also true, that he was a man of indomitable industry, and had the faculty of dressing his opinion in a most fascinating dress. He was an ardent man, too, and sometimes lost sight of the difference between what *may be*, and what *is*. Thus, in demonstrating the proof of the first test, viz., that the plant "must be one which is noxious," he uses this expression: "It exhales a noxious effluvium, and appears to contain a poisonous juice." I dare not say that this plant does not exhale a poisonous effluvium; and while I know that a number of persons believe that coming near to the plant, while the dew is upon it, will, in some cases, produce an erysipelatous eruption on the face and hands, I believe that the instances of such affections are very rare, and perhaps not very well authenticated. Neither am I aware that I have ever been sensible of any odor arising from the shrub. Handling the shrub, certainly does give rise, in some persons, to a troublesome eruption; and we might suppose that, being eaten by cattle, it might produce inflammation of the mouth, œsophagus, and stomach. I am not aware of any fact of that kind. I think, therefore, that the proof adduced is not sufficient to establish the specification. As to the 2d, 3d, and 4th tests, and their proofs, I have nothing to say individually. Prof. D., however, has failed to tell us whether the whole shrub is charged with the production of the disease, or whether the noxious qualities are confined to the leaves and tender twiggs. From some expressions in his monograph, it would appear that the latter was his opinion. But connecting these three tests with the 5th, we draw the conclusion, that the disease is to be found in places where this shrub grows plentifully, and nowhere else. Prof. D., it is true, expressly limits his remarks to a certain region of the State of Ohio; but whatever is necessary to the production of the disease in one place, is necessary to its production in other places. But all places, even in that sec-

tion examined by Prof. D., did not produce the disease, the presence of the *rhus* notwithstanding. Thus, Dr. McGarraugh states "that a gentleman in Washington, a few years ago, inclosed a large woodland pasture, adjoining the town plat, in which were several acres covered by this vine. It was eaten down by his cattle, all of which, however, remained well." To this fact, we may add that, "in the latter part of September last, Mr. Albert Douglass, a student of medicine, at our request, when sojourning at his father's farm, in Fayette County, subjected a steer to the use of this plant, mixed with hay, for ten days, without any injurious effects, though the animal ate it freely." (Drake, *West. Journ.*, vol. iii. p. 222.)

Let us see how Prof. D. gets rid of these troublesome facts. Thus: "On the former of these facts we may remark, that as all the woodlands about Washington have been charged with producing trembles, and are, as we know, not only from the growth of the rhus upon them, but from personal observation, precisely of the kind that generates the disease, the experiment is as valid against every other cause as against the *rhus*." (*Loco cit.*) The logic in this sentence is faulty in two respects. 1st. It had not been demonstrated that the disease was caused by any production of the soil. 2dly. It is not said that the *Bignonia Capreolata* grew in that inclosure. The fair inference is, that it did not, because Dr. McG. believed, and had furnished facts to prove that this latter vine was the cause of trembles. (*Id.*, p. 217.) In explaining away the second fact, Prof. D. says: "We may say that before the experiment was commenced, the leaves had been touched with the frost, and might have lost their activity, and that the animal might have had a peculiarity of constitution which rendered it as insusceptible to the action of the poison, as was the person who gathered the leaves, to its action on the skin." (*Loc. cit.*) Here, again, the author seems to have been "*napping*." He had declared a requisite quality in the plant which could cause the disease, that it must be in leaf in autumn, as well as in summer. Again—"It is in leaf in summer and autumn, when the disease chiefly prevails" (p. 223). But this is not all. A respectable farmer informed him that he had followed, in the snow, the track of several horses to a pond where they went for drink, and found that they had eaten liberally of the tender stems of what he called poison oak. They were soon after seized with the trembles. As to peculiarity of constitution, I have nothing to say. It is certain that some persons, and it is probable that some animals, are very little subject to the action of particular causes. In this

connection, I may quote a letter of Dr. G. B. Taylor, of Morganfield, Ky., to myself, in 1841. He says: "There is no country I have visited which contained more poison oak (rhus toxicodendron), than that rich country in which you are situated, until it was destroyed by the stock. Horses and cattle feed upon it with avidity, wherever it grows, and with impunity. I have just settled in the woods where the poison oak is very abundant. I have no stable as yet, and my riding horse has skinned every poison oak vine I can see, as high as he can reach. There have been several trees cut down, with large vines upon them, and he has peeled them the whole length, where he can get at them, and devoured all the small branches." That the presence of *rhus* is not necessary to the disease, appears from facts mentioned in the same letter. "I believe that females are not so liable to this disease during lactation, though not entirely exempt, as there was an instance at Leonard's, when he lived on the hill at Highland, of a cow and calf dying about the same time, the cow running in a stalk field, and the calf in a calf lot." Again—"Work-oxen, regularly fed, are liable to the disease at the mouth of Highland."

Since my arrival at Washington, I have been so fortunate as to become acquainted with Dr. E. Murphy, of New Harmony, Ind., in whose neighborhood this disease prevails to a considerable extent. He informs me that many persons are affected with the disease, whose cows are kept in cultivated inclosures. Nay, he gave me several instances in which parties were so much afraid of this affection, that they most rigidly abstained from milk, butter, and beef; but yet suffered from the malady.

Just here, I will introduce the following rather singular facts, which occurred in the investigation as to the causes of this disease. This relation gives a strongly-marked instance of the great difficulty which we encounter in the investigation of the causes of disease, and suggests the very great caution which should be used in coming to a determination in these cases.

HAGARSTOWN, WAYNE CO., INDIANA, June 10th, 1858.

DR. SUTTON—

DEAR SIR: I embrace the first leisure moments to redeem my engagements with you, in a description of a small spot of land infected with milk sickness. The original inclosure consisted of some sixty acres, on which was a beautiful spring of never-failing water, and which formed a small rivulet over beautifully white pebbles,

descending an elevation of some fifty to seventy feet, facing to the northeast, and falling into a branch about thirty rods from its appearance on the surface of the earth. About this spring was nothing in appearance different from other springs in its vicinity. Cattle, pasturing in this inclosure, died of the trembles, or slows, as the disease is called here, when it appears in cattle. The spring being near one corner of the inclosure, two or three acres containing the spring were fenced off to itself, from which cattle were excluded, and no more cattle were diseased, although they continued to drink from the rivulet. The fence was moved at various times, till it was placed within some fifty feet of the spring, and always with the same result of disease to cattle feeding inside, and immunity to those outside.

About six years since, the farm on which this spring is situated changed owners, and the timber on the premises has all been removed, and the soil, even to the spring's mouth, turned up to the action of the sun by the plough, since which time this disease has entirely disappeared, as is usual, in all its localities. This land is situated about a mile and a half southwest of this place, and how to explain this peculiarity remains now as much a mystery as ever. When I resided in Delaware County, some sixty miles northwest from this, I was shown a small marshy spot of ground, elevated some twenty-five feet above surrounding land, containing a small spring, running N. W., which sunk into the ground within some thirty rods off, which has been inclosed as above, and the history of which is so similar, that I need not give a description. This spring and marsh have been ditched, and the land cultivated by the plough, and milk sickness is now counted among the things that have been in that section of country. Many more details might be given, but these are deemed sufficient.

If the above shall prove of any service, I am sufficiently rewarded. Respectfully yours,

CALVIN WEST.

From these considerations, we are not prepared to give our adhesion to the hypothesis that trembles in cattle, and milk sickness in man, have their origin in the eating of the *rhus*.

It is true that Dr. Seaton declared that wherever he had known the trembles prevalent, there he had found the arsenicated pyrites; and therefore he believed that arsenic was the active ingredient producing the disease. This fact may be true, and yet the infer-

ence unsatisfactory. Dr. Owen has had his attention turned to this hypothesis, and positively declares that in no case has he discovered either arsenic, or any other poisonous metal present in the water existing in places where trembles or milk sickness prevails. In addition to this, he goes on to argue the negative, by showing the difference between the effects of arsenic, when taken as a medicine, and the symptoms of milk sickness. For myself, I am more willing to confide in his chemical investigations, than in his physiological reasonings upon this point. He argues that as a continued use of arsenic improves the wind, thus enabling a person to ascend heights with more facility, it cannot be the cause of debility, and an incapacity for exercise. But it is generally known that the effects of medicines, and poisons, too, depend very much upon the quantity given, and the frequency with which it is repeated. This is emphatically true as to arsenic. It is equally true that, when given in poisonous doses, the effects produced are very widely variant in different cases. Such, at least, are the teachings of our authorities, for, fortunately, I have no experience on this head. In the cases now under consideration, we have the uncertainty of the dose, and of the frequency of its repetition; but, what is still worse, we have no assurance that the poison has been taken at all. It is thus evident that we have no data on which to reason, as to the agency of arsenic in producing this disease; and the same considerations which lie against Dr. Owen's objections to Dr. Seaton's hypothesis, lie also with equal force against the hypothesis itself.

But Dr. Owen having proved to his own satisfaction, at least, that arsenic is not the cause of the disease, next goes on to prove that the presence of astringent salts, dissolved in water, which is drunk by animals, or entering as component parts of plants eaten as food, produce the trembles. To be sure, he does not appear to have very definite and clear ideas as to the nature of these salts. In the first volume of the Geological Report, he ascribes the disease mainly to the double sulphate of alumina and iron. Chloride of magnesium is also named in this connection. In the second volume of the same work, he lays more stress upon this latter salt. He maintains that all the places which he has noted as infected by this epizootic, are characterized by the presence of what he calls *silicious mudstone*, or *rotten sandstone*. But perhaps it were best to give a somewhat extended quotation from his report, as it seems to embrace his views upon this point.

"Examination of a water, two miles from Downingville, near

Clark's Creek, in Grant County, where the silicious mudstone rock, associated with blue limestone formation, prevails, and where, in dry seasons, milk sickness is prevalent.

"Bicarbonate of magnesia.

"Bicarbonate of lime.

"Chloride of magnesium.

"Sulphate of soda (small).

"Sulphate of magnesia?

"Suspended, and, perhaps, dissolved alumina.

"The most remarkable feature in this, and some other waters to be noticed, occurring along the same range of the geological formation, is the proportion of magnesia, which is considerably more than is usually found in water used for domestic purposes, and which probably exists partly in the state of chloride, which is an objectionable form of magnesian salt for waters in habitual use, in proportion above the normal standard. To determine whether the magnesia is mostly in this condition, would require a careful *quantitative* analysis in the laboratory, which would be a very important investigation, and which I propose hereafter to have instituted, because the therapeutic effects of chloride of magnesium, taken in considerable quantities, border closely on those prominent in milk sickness, as will be perceived by the following description.

"*Action of Chloride of Magnesium on the Animal Economy.*—Acid eructations, with regurgitation of the ingesta; nausea, with accumulation of water in the mouth; *great weakness in the lower limbs, with symptoms of weariness; constipation*, with urgent desire for stool, with shuddering after each effort. Feces, when expelled, are scanty, either soft, or in knots, like *sheep's dung*, with an appearance as if burnt, sometimes covered with mucus. This is followed by a diarrhœa.

"Some of these last effects are, perhaps, not observed in milk sickness, but the first are, so that it is highly probable than an extra portion of this salt, together with other astringent salts, such as sulphate of alumina and iron, and perhaps suspended clay in water, may combine to produce that mysterious disease.

"At all events, it is worthy of particular notice that this complaint follows precisely the geological range of the silicious mudstone or '*rotten sandstone*,' interstratified in the blue limestone formation of Scott, Owen, Grant, Boone, and other counties of Central Kentucky; and, so far as my observations have yet extended, nowhere else within the range of that particular geological

formation; in connection with the fact that the waters, which I have so far had occasion to test, qualitatively, in the most milk-sick regions of these middle counties of the State, contain more than the normal proportion of magnesia. This is the case with the so-called 'Poison Spring,' which I tested in the northeastern part of Grant, and elsewhere along the belt of country ranging with the outcrop of this peculiar member of the rocks of Central Kentucky." (*Geological Survey of Kentucky*, v. ii. p. 80–1.)

In a few places which are charged with milk sickness, I know the geological formation is such as to expect the presence of this bastard sandstone, viz., where the surface is of the sandstone formation, with limestone at no great depth. It appears, too, that this mudstone is found in spots of small extent, in the midst of purely limestone regions. It would appear that this peculiar rock may be expected in that extensive border of the blue limestone region, which commences above Maysville, and making a circuit by Danville, returns to the Ohio River again, above Louisville. And we would expect it to be more plentiful, as we approach the sandstone formation. This would assign it a range of considerable space. Now, I do not know that it is thus extensively found. At any rate, it does not appear that milk sickness occupies any such extensive region of country. Our geological survey has not yet progressed so far as to answer that question. Our geologist, it is true, has told us that wherever the disease is found in these middle counties, this mudstone is also to be found; but he has not made the converse statement that, wherever the mudstone is found, there the disease exists also. Nor is it clear whether his statement applies to the whole State, or only to the blue limestone formation. The words seem to indicate the latter; but the general drift of the reports would rather indicate the former.

In the quotation above given, he lays considerable stress upon the presence of chloride of magnesium, but in three analyses of soils of the milk-sick region in Fayette County (see p. 162—4, vol. ii. *Geological Survey*), no chlorine, and consequently no chloride of magnesium was found. It is true, however, that magnesia and oxide of iron and manganese were found in all, though it would seem not in the form of a double sulphate of alumina and iron, as in other milk-sick regions. The native growth, too, at this spot is widely different from that of most places where milk sickness is found, being beech instead of oak.

Considerable stress is laid upon the similarity of symptoms oc-

casioned by the administration of chloride of magnesium, in considerable quantities, and those of milk sickness. But it would appear from his own showing, that the similarity consists in weakness of the lower limbs, weariness and constipation, this constipation in case of the chloride, too, being followed by diarrhœa. But this sense of weakness and weariness is occasioned by so many causes which disturb the nervous system, that, of itself, it amounts to little. The most distressing symptom of milk sickness, viz., the incessant vomiting, is not noticed. I do not know, either, upon what authority he assigns constipation to the chloride of magnesium. In the *U. S. Dispensatory*, it is characterized as a mild purgative, producing a flow of bile, and an increase of appetite. The dose for an adult would seem to be half an ounce, certainly a much larger dose than would seem at all likely to be taken by an animal at one drink, or in a day.

But it is said that the disease is essentially one of constipation. We may as well, sometimes, compare cases that are similar with each other. Forty years ago, there was a good deal of suffering among the cattle in this neighborhood, from eating the fruit of the buckeye, *Æsculus Ohioensis*. That disease was not very unlike that now known as trembles; but the human subject was never affected; nor were dogs, or hogs, which ate of the carcass, dead of that disease. The buckeye is composed of an outer, thin, hard shell, lined by a thin membrane, which again incloses a large kernel. The membrane lining the shell is very astringent. The kernel is composed mainly of fecula, united with a narcotic quality. Most cows are fond of this fruit, and when they have eaten it freely, they stagger very much, and fall very much, as is said, of trembles. If helped up, they may be able to stagger on, or they may fall again. So characteristic were these motions, that when a man was seen badly intoxicated, he was said to have been "eating buckeyes." The most obstinate constipation ensued; the body swelled greatly; the animal would lie from three or four days to a week or ten days. If the bowels could be freely purged, it would get well, if not, it would die.

We have said thus much of the trembles, because this disease in cattle is thought to be the origin of milk sickness in man. But granting that trembles is attributable to one or the other of the causes enumerated, the question arises, how does that cause continue its deleterious influence, through the animal, upon man? Say we take the *rhus*. Does it act as a narcotic, an irritant? or

in what way? How does it happen, that the influence of the poison is unfelt by the animal which ate it, so long as she gives milk, and that all the injury is received by the calf sucking the mother, or the man eating the beef or drinking the milk? I am not aware of any case in which a poison, received into the stomach, remains entirely innocuous to the recipient, but passes out through one of the secretions, and shows its deleterious effects upon other animals which partake of that secretion as food. Nor is it less remarkable that this secretion should eliminate the poison, as long as it continued to be separated, and that upon its ceasing, the poison should show its effects. As there is no analogous case, we have a right to be sceptical in this instance. As I cannot see any reason to believe the solution as applied to poisons, the same objection lies with redoubled force against the action of an astringent. Can any one conceive the possibility, not to say the probability, of an animal taking, along with its food, a sufficiency of any astringent salt, or of any astringent matter, to act through its economy upon a second animal; it being remembered that the quantity of milk or flesh taken by the second, is inconsiderable in quantity! I confess I cannot. Neither is the postulate, that all this takes place whilst the first animal remains unhurt, to be at all entertained.

We have seen that, in the disease produced by eating buckeyes, nothing of this deleterious consequence occurred to hogs eating the carcass. Neither were any ill effects observed from the milk of such animals as were affected so moderately that they were still able to walk. Astringency alone, then, is not sufficient to produce the effects.

There is one rationale, which I have not seen applied to explain the facts alleged in this case, which yet may be conceived. It is that the poisonous matter, upon being received into the stomach, does not then and there produce a specifically poisonous effect; but by being taken into the system by digestion or otherwise, taints the fluids of the whole body, analogous to what occurs in smallpox, whether the infection is received by the lungs or by the skin. Something of this kind is admitted to occur occasionally in cattle, (from what cause is not known) and which gives rise to *malignant pustule* and some rather anomalous symptoms. Without venturing an opinion whether this may, or may not, be a probable solution of the difficulty, I may be permitted to advert to the want of definite knowledge of the nature and cause of epizootics; and of the effects of vitiated and tainted animal food. I am glad to see that

the attention of the profession is being drawn to this subject. If, upon fuller investigation, it should turn out that vitiated animal food was the cause of milk sickness, still the question would recur: Is this vitiated condition of the food the result of food taken by the animal during its life, or does it arise from other causes? I will add, also, that at present, whilst I admit that deleterious and unhealthy flesh *may*, when used as food, give rise to this disease, I cannot see the probability that it does; and I entirely repudiate the idea that the milk from a cow, apparently healthy, can be the vehicle of poisonous matters eaten as food by her.

Still the question, what is the cause of milk sickness? recurs. It would be presumptuous, in one who had no experience in the disease, to pretend to do that which so many abler men, and who had seen the disease, have failed to do, to the satisfaction of their brethren. I shall only say that I confess myself as belonging to those who think it of malarial origin, and that between the trembles in animals, and milk sickness in man, there is no such relation as cause and effect. I am not so vain as to suppose that I shall be more successful in settling professional opinion on this point than others have been, but I shall offer a few reflections, which appear to me worthy of consideration:—

1. In every location where the disease prevails, notwithstanding the populace as a body may agree that milk or beef is the cause of the disease; yet men are found who strenuously deny that the affection is to be attributed to that cause; who continue to eat the flesh of animals, and drink the milk of cows; and who are yet as free from the disease as others who abstain from both.

2. That persons occasionally die of the disease, who have been very particular to abstain from beef and milk.

3. Although milk forms a large portion of the diet of children in Kentucky, they are admitted to be less liable to the disease than adults; this exemption is in fact remarkable. Of 65 deaths ascribed to this disease, during the five years of registration in Kentucky, only *seven* are given as under five years, one of which was under one year. To which I may add of all ages, only four were colored, and one of these was over eighty years. Of 86 deaths in U. S., in 1850, one was under 1 year and six from 1 to 5 years.

4. The period of the year when the disease prevails, sufficiently corresponds with that for bilious fevers. By general consent, the fatal period is the autumnal months. By reference to our registra-

tion tables, we find that of sixty-four deaths, to which the time of death is affixed, 4 were in January; 2 in March; 2 in April; 1 in May; 2 in June; 4 in July; 8 in August; 10 in September; 8 in October; 14 in November, and 7 in December.

5. It appears in regions in which malarious fevers prevail; and in the same families, contemporaneously with them. See Dr. Barbour's paper. Nay, it has been considered as united with "ague and fever," and with "remittent fever" in the same patient; in the latter instance "commencing as the sick stomach and ending as bilious fever." (Drake, *West. Journ. Med. and Surg.*, vol. iii. p. 180.)

6. It occasionally happens, that the most constant and distressing symptoms of autumnal fevers are persistent vomiting and obstinate constipation—precisely those which have given the name to this disease. In some seasons, only a few cases may be thus characterized, in others, a majority of cases, which are of a grave character.

7. A fact, mentioned by Prof. Drake (*loco citat.*): "In a few instances the complaint has recurred for two or three years, in the season in which it began, without any known reapplication of the remote cause." This is so much after the manner of fevers, and withal so little what might be expected of any noxious article taken in food, that with me it has much weight.

8. The effects of remedies. Dr. Murphy informs me that he finds no great difficulty in moving the bowels; that purging does not always cure; but the cure depends upon setting up that kind of biliary secretion which is of so much importance towards a favorable termination in remittent fever.

Symptoms.—In addition to the description of this disease, given by Dr. Barbour, I will insert that by Prof. Drake: "When the individual is about to be taken down, he feels weary, trembles more or less under exertion, and often experiences pain, numbness, and slight cramps in the calves and other muscles of the legs. At the same time he becomes costive; and, under fatigue, is likely to experience a slight degree of nausea. His appetite is not generally impaired, but he has a feeling of depression and burning at the pit of the stomach. He is irresolute, and as much indisposed to mental as to bodily exertion. He may continue in this situation for a while, and recover spontaneously, or by a single cathartic; but, more commonly, under the influence of an exciting cause, severe symptoms supervene. A full meal, or a great quantity of indigestible food is such a one; but another, far more common and efficient, is violent or protracted muscular exertion. This is, in-

deed, the only exciting cause which all the people, and the physicians of the district, concur in admitting. The patient being subjected to this, full vomiting supervenes, with much epigastric distress. He throws up the contents of his stomach; and, continuing at short intervals to vomit or retch, brings up small quantities of acid mucus, but very seldom much bile. In attempting to sit up, his sickness increases, and his muscles generally become affected with a twitching and tumultuary motion. In lying, he is restless, and tosses himself from side to side in great anxiety. His thirst is generally unquenchable. In the midst of these symptoms, his bowels remain torpid, without pain, and do not swell, but rather seem reduced in volume, with a retraction of the umbilicus towards the spine; so that the pulsation of the aorta can be distinctly perceived. Dr. Thos. McGarraugh, now of Frankfort, Ross County, but for many years an observing practitioner of Washington, Fayette County, states that the tongue is sometimes natural, but, at others, pale and covered with a film of mucus, which is yellow in the middle. In advanced stages of certain violent cases, it looks like a mass of raw flesh. The heart manifests a convulsive action, and the aorta pulsates with untoward violence. Notwithstanding all this, the pulse is sometimes almost natural, and, although in certain cases increased in tension, is not apt to be very frequent. Now and then its diameter becomes very small. These are the remarks of Dr. Toland, which, in the main, correspond with those of other observers. There is no cough; but the patient sighs, and his breath has a singular, offensive, somewhat mercurial odor, so distinct from that in autumnal fever, or any other known disease, as to be regarded quite characteristic of this. The skin is generally cool, in the latter stages cold; Dr. McGarraugh has, however, in some cases, observed increased heat in the thorax. The surface generally is always dry.

"Many cases are cured, when the symptoms here enumerated are present; but others go on to a fatal termination. In such, the irritability of the stomach is often so great that the least motion in bed, or a moment's conversation, will bring on retching or vomiting, when, in several instances, the patient has thrown up a dark colored matter, like that ejected in fatal cases of yellow fever; death does not, however, so constantly follow this discharge as it does the coffee-ground evacuation in that disease. The constipation continues, and the retraction of the umbilicus rather increases than diminishes. There is no peritoneal soreness on pressure;

even the epigastrium does not appear to be particularly tender, but pressure upon it is apt to excite vomiting. The sighing becomes deeper, and a hiccough supervenes, which is not always followed by death. The pulse gradually sinks in fulness and force, but the struggling movement of the heart, and the convulsive throbbing action of the aorta, are rather augmented than abated. The visage of the patient, seldom red in the earlier stages, now becomes deathly pale and shrunk up. He tosses less, becomes listless, indifferent to what is passing round him, and often lies, between his fits of retching, in a mild coma. Very seldom is there any delirium; he answers well, and does not often mutter when left to himself: there is, however, a peculiar feebleness of attention, insomuch that many, who have recovered from this advanced stage of the disease, and were supposed at the time to be cognizant of all that passed around them, were found afterwards not to remember much of what had transpired; not even the death of relatives, who had died of the same disease, in the same rooms with themselves."

Considerable stress is laid upon the peculiar odor of the breath. Prof. Drake describes it as a somewhat mercurial odor. Others speak of it as peculiar, without attempting to compare it to any other odor. Dr. Emison, of this county, who has seen several cases which he considers well marked, says the odor is not of a mercurial character, but very near to that of children affected with worms: that it is strong, filling the room, and that where there is no want of cleanliness. Dr. Brown, of Bellefontaine, Ohio, informs me that it is somewhat similar to garlic; as also to an odor sometimes emitted by what is thrown up in bad cases of bilious fever. Another gentleman, whose name I do not now recollect, considers the odor more like the bed of mice. Others, again, speak of it as different from all other odors, and, therefore, not capable of being described by them. All say that, when once perceived, it is not to be forgotten, and that it is in all cases well marked.

Treatment.—The treatment pursued by Dr. Barbour is detailed in his paper, which forms a part of this report. I shall add but little from other sources. In the district in Ohio in which Prof. Drake's observations were made, the treatment by different physicians varied more or less.

1. *Bloodletting* was used by Dr. McGarraugh in about one-third of his patients. When the pulse was full, hard, and not frequent, it answered better; when small, it rarely increased in fulness and

force after bleeding. He bled freely when some affection of the brain existed. He found his patients often inclined to syncope; Dr. Toland rarely, except when the brain was affected. Other physicians bled rarely, or not at all.

Dr. Taylor, of Morganfield, mentions a case in which the heart's motion was tumultuous, "so strong that you could see the whole system shake at each pulsation. The pulse was slow and strong, and not more than fifty in the minute." "I bled him three times freely, and he grew worse after each bleeding. He was disposed to faint, when bled, and, upon recovering from syncope, would vomit, and in a short time after, his pulse would be as strong as ever."

2. *Cathartics* are, by general consent, the remedy in this disease. In the forming stage they act promptly and kindly, warding off violent symptoms. When vomiting has set in, they are less reliable, because of the difficulty of retaining anything in the stomach. Calomel was found to be better on the stomach than other cathartics, and was principally used. It was given in large and repeated doses. "A respectable merchant in Washington, Fayette County, who had all the symptoms of the complaint, took many large doses of calomel daily, without the least effect till the fifth day. He then resorted to Seidlitz powders, when vomiting ceased, and purging and salivation came on simultaneously." (Drake, *loc. cit.*) As adjuncts to calomel, sulphate of magnesia, senna, castor oil, and oil or turpentine, were used. Enemata were also employed, with variable success.

From the observation of Dr. Murphy, it appears that simply moving the bowels is a matter of little consequence, the benefit depending upon a proper biliary secretion. He says, when this is accomplished, the patient is as sure to recover, as one similarly situated in bilious *fever*. He thinks calomel decidedly injurious. As a cathartic, he uses rhubarb and bicarbonate of soda, in free doses, at intervals of six hours, as may be necessary.

Dr. Toland had a patient in whom costiveness continued for fourteen days, yet he recovered.

3. *Opium* was extensively used to allay the irritability of the stomach, and prepare for the retention of calomel. It was advantageously combined with calomel. It did not seem to increase the constipation.

4. *Counter-irritants.*—Blisters, sinapisms, and oil of turpentine have all been applied to the epigastrium, with apparent benefit.

Dr. West has received no benefit from either cupping or blisters to the epigastrium; on the contrary, blisters have been very annoying to the patient, and he was compelled to quiet the irritation occasioned by them. He found a coating of a solution of tannin a very prompt and efficient means to do this. He attributes very great relief to stupes of turpentine.

5. *Cold affusions* to the head, when there was much cerebral disturbance from either the disease itself or because of free use of opiates, were of much service. Dr. Toland used the general cold dash with advantage. In the patient mentioned above, in whom costiveness continued fourteen days, purging followed on the cold affusion.

Pathology.—Our knowledge of the pathological appearances of this disease is very limited. From the mortuary returns, in the United States Census of 1850, it would appear that the disease is not so prevalent, or mortal, as would have been supposed. But eighty-six were returned from the whole Union, distributed as follows, viz: Illinois, 14; Indiana, 43; Kentucky, 8; Ohio, 14; Tennessee, 4; North Carolina, 3. And during five years, during which the causes of death have been registered in Kentucky, 65 have been ascribed to this disease. This, however, is no sufficient warrant that more have not been learned of its *post-mortem* appearances. It must be acknowledged, however, that a difficulty of no small magnitude lies in the way of acquiring correct and definite ideas on this head. Deaths from this disease occur in country places, and, perhaps, where the population is sparse, where the physician travels over a large territory, and withal, probably, not well qualified to make autopsies in a manner to throw much light on pathology.

On account of the connection, real or supposed, between the trembles in animals and the milk sickness in man, I will quote the result of Prof. Drake's labors in the State of Ohio (to which I have so often referred), as to the morbid appearances in that disease.

Dr. Toland inspected the abdominal viscera of several cattle dead of this disease [trembles]. The contents of the manyplies, or third stomach, were dry and hard, its mucous membrane dry, and seemed to adhere to the alimentary mass, with which it would come away, though it did not appear to be mortified. The mucous membrane of the small intestines was in some places dry, and in others greatly injected with blood; their contents were hardened; they were not distended with gas. The gall-bladder was filled with dark pitchy bile. In some cases, the kidneys were nearly black, and appeared

to be gangrenous. On opening the carcases (before putrefaction had commenced), an offensive odor was emitted, not unlike that attendant on a mercurial salivation; an observation confirmed by Lewis Skelling, who lives near South Charleston, in Clark County. He lost twenty-one cattle about this time, and found, on skinning them, that "every one emitted an offensive odor, of a peculiar kind, before the cavities were opened." This dryness of the contents of the alimentary canal was observed by Horney, of Fayette County, Kelly, near Martinsburg, and Pearce, near South Charleston, who seem to have been farmers. The last also reported the mucous membrane of the bowels red.

In *West. Journal Med. and Surgery*, vol. iv. p. 234, is a report of the examination of a body, dead from milk sickness, made by Dr. J. V. Wagman, of New Castle, Indiana. No medicine had been taken until a few hours before death. All which he then took was immediately ejected. The symptoms during the illness are not given.

"The body was not much emaciated. The skin had a dusky yellowish hue. The brain and its membranes exhibited nothing remarkable, except, perhaps, more than the usual quantity of serum in the ventricles.

"The stomach presented a number of patches of light brown and scarlet colors mixed. In some places the mucous membrane was thickened and soft. The pyloric orifice was of a scarlet hue. The mucous membrane of the duodenum presented the same kind of patches with that of the stomach; and some parts were dry. The bowel itself, as well as the lower part of the stomach, was much contracted. The other small intestines were pale; the mucous membrane was softened, many parts of it were dry. The glands of Peyer and Brunner were swollen and soft, and some of them appeared to be ulcerated. The cæcum was dry. The colon contained hardened feces, on which it contracted closely; was drier than other portions of the tube; its color was a dark brown, with rose colored patches. The liver was of a dark color, and seemed unusually friable under pressure by the fingers; the gall-bladder was much distended by black pitchy bile. The pancreas was of a rose color, and appeared rather soft. The spleen was enlarged, of a deep brown color, and very soft. The peritoneum had reddish spots, and there was some increased effusion in its cavity. The kidneys, bladder, heart, and lungs were sound.

"It is proper to say, that Dr. Wagman modestly intimates that

his experience in *post-mortem* inspections has not been sufficiently extensive to give him confidence in his own observations."

NOTES AS TO THE TABLES.

Table I. contains a statement of the number of acres of land, compiled from the report of the Auditor of Kentucky, the number of improved and unimproved acres, compiled from the U. S. Census of 1850 (the Auditor's report gives 6,000,000 acres as the area of the State more than the Census—that amount possibly being held by non-residents—but does not give the quantity of improved and unimproved land, each of which also is doubtless more than stated in Census); the number of acres to each inhabitant; the average number of those dying annually, of each of the diseases named, and the proportion of deaths to the population of each county. But, in a few counties, but one or two had died of a particular disease, in five years. In such cases, one is put down as the annual average. In all other cases, the nearest number is used to avoid fractions.

In Table II. the annual average mortality of each county of the limestone regions is shown, and the average number of deaths from each disease, and the proportion of each to the whole number of deaths from ascertained causes.

Table III. shows the same facts in the coal regions. It must be observed, however, that in these, the springs and wells furnish, in some places, hard, and in some, soft water; to what extent is unknown. In these two tables, the very large number of zymotics to the whole number of deaths, has induced me to carry the number to two decimals.

Then follows a series of tables, intended to elucidate the natural history of individual diseases, as cholera, dysentery, &c. In these, the influence of disease upon color, age, and sex, is indicated, as also the relative influence of each month on the disease. These tables are to be read thus: the first line of white males refers to the year 1852; the second to '53, and so on to '56. The other divisions are similarly constructed. It is thus easy to compare the entire white, with the entire colored mortality, or the mortality of the sexes of either race. In estimating the relative mortality among the white and colored races, it is important to remember that in Kentucky, there are about *seven* whites to *two* colored.

In noticing and comparing the Tables II. and III., we shall be sensible of some marked differences in the proportion of deaths from special diseases to the whole number of deaths from all causes. Thus, the mortality from cholera in the whole limestone region was 1 in 22, of all specified causes. Again, in the blue and coral limestone, it was 1 in 18, while in the cavernous limestone, it was 1 in 34, indicating that this disease caused

a much larger proportion of all, in the blue limestone, than in the cavernous region. Again, the mortality from this disease in the coal regions was 1 in 32. But, when we compare the two fields, we see a mortality of 1 in 26 of specified deaths in the southern field, and 1 in 56 in the eastern, and a mortality in the limestone much greater than in the coal regions.

Again, if we take up dysentery, we shall find in the limestone regions a mortality of 1 in 7; in the blue, 1 in 10; and in the cavernous 1 in 6. Here, the preponderance is in favor of the blue limestone. Again, when we go to the coal fields, we have a mortality of 1 in 5; in the southern, 1 in 6, and in the eastern, 1 in 4. Here the mortality is greater in the coal region.

If we look to fevers—which include all fevers except scarlet and puerperal—we have, in the limestone counties, the proportion of 1 in 7; in the blue, 1 in 9; in the cavernous, 1 in 6. Again, in the coal fields, 1 in 6, the southern and eastern being equal. Again, a slight difference against the cavernous limestone, and also against the coal regions.

Again, if we investigate the ravages of scarlatina, we shall find the proportion of deaths from it in the limestone regions to be 1 in 27; in the blue, 1 in 22—and in the cavernous, 1 in 39; being quite an odds in favor of the cavernous. Again, if we turn to the coal fields, we shall find an average of 1 in 20—being 1 in 47 in the southern, and 1 in 10 in the eastern field. This is a very startling disproportion, yet it would seem to be below the truth, as I observe that I have not included Laurel in the counties in the eastern coal field. This disproportion seems to have been occasioned by a severe epidemic of scarlatina, in a number of the mountain counties. It will be seen that in Knox County, the average number of deaths from scarlatina was 21, whilst the average number from specified causes was but 48. Again, in 1854, of 131 deaths from all causes, 98 were from scarlatina—these deaths from it being an excess over all the deaths in ordinary years. In the same year, the mortality in the adjoining county of Laurel was very heavy, one-half of which was from scarlatina.

When we turn our eyes to the whole class of zymotics, and compare the different regions with each other, and the different counties with each other, we shall be struck at once with the very large number dying of this class of diseases, in proportion to the whole number of deaths; one death from this class to 2.15 from all causes being the most favorable proportion for any division, and 1 to 4.44 for any single county.

We dare not depend on our returns as giving anything like the number of deaths in the State, or from any county, or we might claim our State to be peculiarly healthy, and especially free from all other forms of disease, except those of this class. But even that view would show us to be great sufferers from zymotics. As it is, we must keep our judgment in abeyance until we have more reliable returns.

In the blue limestone, 1 in every 2.15 died of the diseases belonging to this class; in the cavernous, 1 in 1.87, giving an average of 1 in 2.01 for the whole limestone counties. In the coal fields, the proportion was 1 in 1.69; 1 to 1.85 in the southern, and 1 to 1.49 in the eastern.

The eastern coal field is mountainous, a large portion very much so. Here, too, of necessity, the country is less cultivated, and the state of society less advanced; and here we find the largest proportion of deaths from zymotics. It may be, that this is largely attributable to the extensive prevalence of scarlatina in some of the counties. It is a fact, however, that the proportion of zymotic deaths is as large in counties where there was little or no scarlatina, as in those where it prevailed. Another feature in these tables is the great uniformity of proportion in the counties in each formation.

It may be well to remark that, in Table VII., under the head of continued fever, are included such deaths as were ascribed to typhus, typhoid, and winter fever; and in Table VIII. are included all that were thus returned, and that, doubtless, a large proportion properly belonged to Table VII.

In reading this last lot of tables, it will be recollected that the first line refers to the death of white males in 1852; the second to the same in 1853, &c., and that the same rotation is observed in the white females and in the colored race.

I will add that, although I do not look upon croup as properly included in the zymotic class, yet as it is so placed, and as it is charged with a heavy mortality in Kentucky, I have been willing to take the pains necessary to construct the table.

TABLE I.

Showing the population, the area, the number of acres of improved and unimproved land (digested from the Auditor's Report and the U. S. Census); the average number of acres to each inhabitant; the number of those dying of certain diseases; and of the class zymotic; and the proportion of those deaths to the population of each county.

COUNTIES.	POPULATION.	ACRES OF LAND.				CHOLERA.		DYSENTERY.		FEVERS.		SCARLATINA.		ZYMOTICS.	
		Whole number.	Improved.	Unimproved.	To 1 inhabitant.	Annual average.	Population to 1 death.	Annual average.	Population to 1 death.	Annual average.	Population to 1 death.	Annual average.	Population to 1 death.	Annual average.	Population to 1 death.
Adair . .	9,898	243,068	63,746	145,395	25	1	9,898	11	900	4	2,475	3	3,299	23	430
Allen . .	8,742	198,531	46,188	105,913	23	1	8,742	34	257	15	583	0	...	64	137
Anderson . .	6,260	106,383	43,208	35,303	17	6	1,043	6	1,043	15	417	6	1,043	44	142
Ballard . .	5,496	231,933	20,876	87,976	42	2	2,748	4	1,374	3	1,832	0	...	18	305
Barren . .	20,240	378,757	117,604	204,564	19	6	3,373	35	578	45	450	4	5,060	126	161
Bath . .	12,115	255,723	108,170	54,783	21	1	12,115	28	433	8	1,514	6	2,019	53	228
Boone . .	11,185	154,984	92,910	65,369	14	5	2,237	12	932	20	559	4	2,796	50	224
Bourbon . .	14,466	168,118	168,891	1,111	12	12	1,205	33	438	19	761	4	3,616	82	176
Boyle . .	9,116	107,905	53,717	43,151	14	2	4,558	8	1,139	6	1,519	1	9,116	20	456
Bracken . .	8,903	139,144	41,196	48,436	16	5	1,781	5	1,781	12	742	2	4,452	35	254
Breathitt . .	3,785	224,601	13,517	274,043	59	1	3,785	6	631	10	378	1	3,785	24	158
Breckinridge .	10,593	328,038	67,822	181,745	31	4	2,648	9	1,177	15	706	1	10,593	59	179
Bullitt . .	6,774	171,490	50,144	111,734	25	13	521	5	1,355	15	452	3	2,258	42	167
Butler . .	5,755	222,018	26,272	112,896	39	5	1,151	10	575	18	319	5	1,151	50	115
Caldwell . .	13,048	190,863	69,713	182,549	15	1	13,048	11	1,186	24	544	3	4,349	57	229
Calloway . .	8,096	247,351	48,164	184,409	30	2	4,048	5	1,619	16	506	6	1,349	51	159
Campbell . .	13,127	87,876	27,009	33,111	7	8	1,641	10	1,313	10	1,313	11	1,193	72	182
Carroll . .	5,526	74,109	30,663	36,601	13	1	5,526	4	1,381	11	502	1	5,526	20	276
Carter . .	6,241	308,363	28,234	218,630	49	1	6,241	22	284	7	891	1	6,241	39	160
Casey . .	6,556	207,241	49,594	140,339	31	1	6,556	8	819	5	1,311	1	6,556	19	345
Christian . .	19,580	389,370	105,670	171,260	20	24	816	25	783	33	593	7	2,797	122	160
Clarke . .	12,683	187,331	153,096	17,056	14	3	4,228	11	1,153	11	1,153	4	3,171	39	325
Clay . .	5,421	235,008	19,186	137,006	25	1	5,421	9	602	8	678	2	2,710	26	208

TABLE I.—Continued.

COUNTIES.	POPULATION.	ACRES OF LAND.				CHOLERA.		DYSENTERY.		FEVERS.		SCARLATINA.		ZYMOTICS.	
		Whole number.	Improved.	Unimproved.	To 1 inhabitant.	Annual average.	Population to 1 death.	Annual average.	Population to 1 death.	Annual average.	Population to 1 death.	Annual average.	Population to 1 death.	Annual average.	Population to 1 death.
Clinton . .	4,889	101,855	29,770	55,767	21	0	...	11	444	8	611	1	4,889	29	169
Crittenden .	6,351	180,037	34,016	103,958	28	1	6,351	14	454	15	423	1	6,351	40	159
Cumberland .	7,005	147,810	40,066	108,351	21	1	7,005	6	1,167	10	700	4	1,751	22	319
Daviess . .	12,362	255,447	67,408	312,489	21	2	6,181	7	1,766	16	773	1	12,362	40	309
Edmonson .	4,088	152,067	20,027	75,294	37	1	4.088	9	454	4	1,022	...	...	16	255
Estill . .	5,985	192,451	26,839	84,619	32	1	5,985	16	374	4	1,496	...	...	28	214
Fayette . .	22,735	173,810	173,818	1,404	8	16	1,421	24	948	14	1,624	10	2,273	73	311
Fleming . .	13,914	264,424	102,879	100,906	19	16	870	18	773	15	928	7	1,988	66	211
Floyd . .	5,714	254,573	16,700	94,897	44	0	...	5	1,143	3	1,905	1	5,714	13	440
Franklin . .	12,462	119,861	61,895	52,969	9	2	6,231	11	1,133	21	593	4	3,115	51	244
Fulton . .	4,446	102,813	17,672	44,948	23	9	494	13	342	9	494	2	2,223	27	165
Gallatin . .	5,137	60,363	25,976	32,497	12	1	5,137	2	2,568	3	1,712	1	5,137	10	514
Garrard . .	10,237	143,045	92,140	47,989	14	3	3,412	8	1,280	16	640	2	5,118	45	227
Grant . .	6,531	146,977	40,544	74,839	23	2	3,265	3	2,177	3	2,177	1	6,531	10	653
Graves . .	11,397	326,853	56,868	228,342	29	1	11,397	16	712	28	404	1	11,397	80	142
Grayson . .	6,837	219,197	36,612	115,857	32	0	...	21	326	15	456	4	1,709	55	124
Greene . .	9,060	179,986	61,323	114,576	20	1	9,060	23	394	19	477	2	4,530	53	171
Greenup . .	9,654	302,215	30,008	111,396	32	1	9,654	18	536	12	804	1	9,654	36	268
Hancock . .	3,853	97,406	17,775	44,274	25	4	963	4	963	8	481	0	...	26	148
Hardin . .	14,525	339,614	108,282	257,081	23	6	2,421	11	1,320	15	968	6	2,421	75	195
Harlan . .	4,268	427,155	19,052	288,717	100	1	4,268	1	4,268	5	854	1	4,268	11	388
Harrison . .	13,064	202,935	137,883	63,283	16	4	3,266	10	1,306	8	1,633	5	2,613	37	353
Hart . .	9,093	206,026	47,659	135,584	23	2	4,546	27	337	31	296	1	9,093	76	253
Henderson .	12,171	284,256	70,432	160,711	23	7	1,739	11	1,107	22	553	2	6,085	62	196
Henry . .	11,442	175,780	118,714	44,496	15	1	11,442	14	.817	23	498	7	1,635	59	194
Hickman . .	4,791	158,476	21,874	62,939	33	6	797	10	479	18	266	2	2,395	42	114
Hopkins . .	12,441	360,355	70,065	204,441	29	3	4,147	53	235	22	566	1	12,441	91	137
Jefferson . .	59,831	222,466	90,720	65,928	4	20	2,991	21	2,849	46	1,301	9	6,648	135	443

TABLE I.—Continued.

COUNTIES.	POPULATION.	ACRES OF LAND.				CHOLERA.		DYSENTERY.		FEVERS.		SCARLATINA.		ZYMOTICS.	
		Whole number.	Improved.	Unimproved.	To 1 inhabitant.	Annual average.	Population to 1 death.	Annual average.	Population to 1 death.	Annual average.	Population to 1 death.	Annual average.	Population to 1 death.	Annual average.	Population to 1 death.
Jessamine	10,249	106,040	65,485	42,304	10	8	1,281	9	1,139	7	1,464	3	3,416	36	285
Johnson	3,873	163,765	15,094	110,382	42	1	3,873	9	430	6	646	4	968	27	143
Kenton	17,038	94,452	41,616	36,915	6	11	1,576	13	1,311	13	1,311	9	1,893	70	243
Knox	7,050	186,654	32,595	127,548	26	1	7,050	3	2,350	5	1,410	21	336	34	207
Larue	5,859	154,272	32,961	75,335	26	1	5,859	17	345	10	586	2	2,929	41	143
Laurel	4,145	242,406	22,759	152,864	58	1	4,145	8	518	8	518	7	592	32	130
Lawrence	6,281	240,602	26,665	173,411	38	1	6,281	14	449	8	785	3	2,094	39	161
Letcher	2,511	103,546	11,261	89,328	41	0	...	5	502	2	1,255	0	...	9	279
Lewis	7,202	266,033	34,662	86,054	31	3	2,401	13	554	6	1,200	4	1,801	36	200
Lincoln	10,093	178,556	90,094	77,288	18	6	1,682	17	594	7	1,442	1	10,093	39	259
Livingston	6,578	159,756	26,902	96,758	24	2	3,289	6	1,097	19	346	3	2,193	41	160
Logan	16,581	327,104	105,036	167,760	19	1	16,581	36	455	32	518	2	8,290	96	173
Lyon	...	121,470	...	...	...	1	...	8	...	5	...	0	...	24	...
Madison	15,727	203,123	149,164	102,331	13	3	5,242	24	655	16	983	2	7,863	63	250
Marion	11,765	200,487	86,959	125,741	17	1	11,765	28	420	14	840	1	11,765	66	178
Marshall	5,269	183,529	18,521	67,930	35	1	5,269	1	5,269	11	479	4	1,317	29	182
Mason	18,344	148,606	93,559	56,884	8	24	764	18	1,019	17	1,079	6	3,057	94	195
McCracken	6,067	137,350	16,477	56,399	23	2	3,033	4	1,517	14	433	6	1,011	35	173
McLean	...	119,837	...	...	...	0	...	7	...	7	...	1	...	22	...
Meade	7,391	176,690	40,366	80,573	24	2	3,695	6	1,232	15	493	3	2,464	39	190
Mercer	14,067	153,003	97,281	48,454	11	9	1,563	15	938	12	1,172	13	1,082	66	213
Monroe	7,756	171,807	43,662	91,922	22	1	7,756	23	338	14	554	6	1,293	49	158
Montgomery	9,903	174,427	99,296	121,970	18	8	1,238	27	367	10	990	1	9,903	62	160
Morgan	7,620	495,689	31,742	260,193	65	1	7,620	36	212	8	953	8	953	68	112
Muhlenburg	9,809	252,334	50,935	202,285	26	2	4,904	22	446	9	1,090	3	3,270	51	192
Nelson	14,789	244,821	112,574	96,702	17	9	1,643	15	986	27	548	3	4,930	78	190
Nicholas	10,361	144,099	57,092	49,908	14	3	3,454	6	1,727	6	1,727	1	10,361	19	545
Ohio	9,749	326,450	55,196	165,500	33	3	3,249	15	650	25	390	2	4,875	52	187

TABLE I.—Continued.

COUNTIES.	POPULATION.	ACRES OF LAND.				CHOLERA.		DYSENTERY.		FEVERS.		SCARLATINA.		ZYMOTICS.	
		Whole number.	Improved.	Unimproved.	To 1 inhabitant.	Annual average.	Population to 1 death.	Annual average.	Population to 1 death.	Annual average.	Population to 1 death.	Annual average.	Population to 1 death.	Annual average.	Population to 1 death.
Oldham . .	7,629	108,289	59,490	30,406	14	3	2,543	5	1,526	10	763	2	3,815	28	272
Owen . .	10,444	212,162	64,755	95,840	20	4	2,611	4	2,611	7	1,492	2	5,222	22	475
Owsley . .	3,774	220,822	14,887	226,241	59	0	...	11	343	5	755	0	...	21	180
Pendleton .	6,774	169,393	39,977	86,779	24	2	3,387	5	1,355	6	1,129	4	1,693	28	242
Perry . .	3,092	294,892	14,145	279,673	95	0	...	6	515	6	515	0	...	18	172
Pike . .	5,365	265,643	18,474	178,006	50	1	5,365	5	1,073	2	2,682	1	5,365	17	316
Powell . .	...	127,780	...	...	...	1	...	6	...	2	...	0	...	12	...
Pulaski . .	14,195	368,967	75,259	247,002	26	1	14,195	31	458	15	746	8	1,774	75	189
Rockcastle .	4,697	152,254	25,938	73,463	31	1	4,697	13	361	5	939	0	...	25	183
Rowan . .	...	...	...	...	...	...	...	...	...	2	...	...	...	2	...
Russell . .	5,349	135,558	42,342	87,997	25	0	...	9	594	10	525	1	5,349	30	178
Scott . .	14,946	170,337	126,756	27,684	11	4	3,736	15	996	14	1,068	2	7,473	49	305
Shelby . .	17,095	256,291	147,170	76,556	15	5	3,419	28	611	34	503	20	855	112	153
Simpson . .	7,733	120,521	45,296	72,419	16	1	7,733	37	209	5	1,547	0	...	56	138
Spencer . .	6,842	114,141	77,496	39,319	17	4	1,711	5	1,368	6	1,140	1	6,842	20	342
Taylor . .	7,250	149,812	45,888	70,833	20	3	2,417	13	558	14	518	1	7,250	42	173
Todd . .	12,268	205,400	78,511	108,805	17	0	...	15	818	11	1,115	4	3,067	47	261
Trigg . .	10,129	246,592	50,143	14,816	24	2	5,064	14	724	20	507	6	1,688	63	161
Trimble . .	5,963	89,993	37,287	38,002	15	2	2,981	4	1,491	8	745	1	5,963	22	271
Union . .	9,012	253,612	52,453	141,403	28	9	1,001	7	1,288	11	819	0	...	34	265
Warren . .	15,123	300,514	91,507	155,325	20	8	1,890	38	398	22	687	3	5,041	96	158
Washington .	12,194	186,469	102,441	83,802	15	9	1,355	25	488	22	554	2	6,097	66	185
Wayne . .	8,692	257,823	69.532	190,897	28	...	...	24	362	11	790	1	8,692	43	202
Whitley . .	7,447	278,889	38,863	214,207	37	1	7,447	4	1,862	6	1,241	11	677	29	257
Woodford . .	12,423	120,883	108,828	7,347	9	5	2,485	9	1,380	13	956	3	4,141	41	303
	982,405	21,044,403	5,968,270	10,981,478	21	398	2,462	1,329	739	1,340	733	354	2,775	4,669	211

TABLE II.—*Showing the Proportional Mortality from certain Diseases in the Limestone Regions in Kentucky.*

COUNTIES.	Average annual deaths from specified causes.	CHOLERA.		DYSENTERY.		FEVERS.		SCARLATINA.		ZYMOTICS.	
Limestone, blue and coral.		Average annual deaths.	1 to specified causes.	Average annual deaths.	1 to specified causes.	Average annual deaths.	1 to specified causes.	Average annual deaths.	1 to specified causes.	Average annual deaths.	1 to specified causes.
Anderson . .	85	6	14	6	14	15	6	6	14	44	1.93
Boone . . .	141	5	28	12	12	20	7	4	35	50	2.82
Bourbon . .	193	12	16	33	6	19	10	4	48	82	2.35
Boyle . . .	44	2	22	8	5	6	7	1	44	20	2.20
Bracken . .	79	5	16	5	16	12	9	2	39	35	2.26
Carroll . .	41	1	41	4	10	11	4	1	41	20	2.05
Clarke . . .	82	3	27	11	7	11	8	4	20	39	2.10
Campbell . .	151	8	19	10	15	10	15	11	14	72	2.10
Fayette . .	172	16	11	24	7	14	12	10	17	73	2.36
Fleming . .	133	16	8	18	8	15	9	7	19	66	2.02
Franklin . .	130	2	65	11	12	21	7	4	33	51	2.55
Gallatin . .	24	1	24	2	12	3	8	1	24	10	2.40
Garrard . .	109	3	36	8	14	16	7	2	54	45	2.42
Grant . . .	21	2	10	3	7	3	7	1	21	10	2.10
Harrison . .	79	4	20	10	8	8	10	5	16	37	2.13
Henry . . .	121	1	121	14	9	23	5	7	17	59	2.05
Jessamine .	73	8	9	9	8	7	10	3	24	36	2.03
Kenton . .	143	11	13	13	11	13	11	9	16	70	2.04
Lewis . . .	57	3	19	13	4	6	10	4	14	36	1.60
Mason . . .	230	24	10	18	13	17	14	6	38	94	2.45
Mercer . . .	157	9	17	15	10	12	13	13	12	66	2.38
Nicholas . .	36	3	12	6	6	6	6	1	36	19	1.90
Oldham . .	64	3	21	5	13	10	6	2	32	28	2.29
Owen . . .	53	4	13	4	13	7	8	2	27	22	2.41
Pendleton .	60	2	30	5	12	6	10	4	15	28	2.15
Scott . . .	144	4	36	15	10	14	10	2	72	49	2.94
Shelby . .	256	5	51	28	9	34	8	20	13	112	2.29
Spenser . .	44	4	11	5	9	6	7	1	44	20	2.20
Trimble . .	59	2	29	4	15	8	7	1	59	22	2.68
Woodford .	138	5	28	9	15	13	11	3	46	41	3.37
Total . .	3,119	174	18	328	10	366	9	141	22	1,356	2.15
Cavernous limestone.											
Adair . . .	46	1	46	11	4	4	11	3	15	23	2.00
Allen . . .	109	1	109	34	3	15	7	...	...	64	1.70
Barren . . .	220	6	37	35	6	45	5	4	55	126	1.76
Breckinridge?	66	4	16	9	7	15	4	1	66	59	1.12
Caldwell? . .	103	1	103	11	9	24	4	3	34	57	1.81
Christian . .	240	24	10	25	10	33	7	7	34	121	1.98
Cumberland .	44	1	44	6	7	10	4	4	11	22	2.00
Edmonson .	25	1	25	9	3	4	6	...	...	16	1.56
Greene . .	92	1	92	23	4	19	5	2	46	53	1.74
Hardin . .	132	6	22	11	12	15	9	6	22	75	1.76
Hart . . .	132	2	66	27	5	31	4	1	132	76	1.74
La Rue . .	182	1	182	17	11	10	18	2	91	41	4.44
Logan . . .	199	1	199	36	6	32	6	2	100	96	2.07
Monroe . .	69	1	69	23	3	14	5	6	11	49	1.20
Meade . . .	69	2	34	6	12	15	5	3	23	39	1.77
Simpson . .	79	1	79	37	2	5	16	...	...	56	1.41
Todd . . .	88	...	...	15	6	11	8	4	22	47	1.87
Trigg . . .	126	2	63	14	9	20	6	6	21	63	2.00
Taylor . . .	76	3	26	13	6	14	5	1	76	42	1.81
Warren . .	181	8	23	38	5	22	8	3	60	96	1.90
Total . .	2,278	67	34	400	6	358	6	58	39	1,221	1.87
In both . .	5,397	241	22	728	7	724	7	199	27	2,577	2.01

Table III.

Showing the Proportional Mortality of certain Diseases in the Coal Fields of Kentucky.

COUNTIES.	Average annual deaths from specified causes.	CHOLERA.		DYSENTERY.		FEVERS.		SCARLATINA.		ZYMOTICS.	
Southern field.		Average annual deaths.	1 to specified deaths.	Average annual deaths.	1 to specified deaths.	Average annual deaths.	1 to specified deaths.	Average annual deaths.	1 to specified deaths.	Average annual deaths.	1 to specified deaths.
Butler . . .	91	5	18	10	9	18	5	5	18	50	1.82
Daviess . .	98	2	49	7	14	16	6	1	98	40	2.45
Grayson . .	91	...	...	21	4	15	6	4	23	55	1.65
Hancock . .	58	4	15	4	15	8	7	...	...	26	2.23
Henderson .	134	7	19	11	12	22	6	2	67	62	2.16
Hopkins . .	137	3	46	53	3	22	6	1	137	91	1.51
McLean . .	43	...	...	7	6	7	6	1	43	22	1.95
Muhlenburg .	78	2	39	22	4	9	9	3	26	51	1.53
Ohio . . .	86	3	29	15	6	25	3	2	43	52	1.65
Union . . .	77	9	9	7	11	11	7	...	...	34	2.26
Total . .	893	35	26	157	6	153	6	19	47	483	1.85
Eastern field.											
Breathitt . .	33	1	33	6	5	10	3	1	33	24	1.38
Clay . . .	39	1	39	9	4	8	5	2	19	26	1.50
Floyd . . .	22	...	...	5	4	3	7	1	22	13	1.69
Greenup . .	57	1	57	18	3	12	5	1	57	36	1.58
Harlan . .	13	1	13	1	13	5	3	1	13	11	1.18
Johnson . .	34	1	34	9	4	6	6	4	8	27	1.26
Knox . . .	48	1	48	3	16	5	10	21	2	34	1.41
Lawrence . .	61	1	61	14	4	8	8	3	20	39	1.56
Letcher . .	13	...	...	5	3	2	6	...	...	9	1.45
Morgan? . .	99	1	99	36	3	8	12	8	12	68	1.46
Owsley . .	35	...	...	11	3	5	7	...	...	21	1.57
Perry . . .	24	...	...	6	4	6	4	...	...	18	1.33
Pike . . .	34	1	34	5	7	2	17	1	34	17	2.00
Whitley . .	44	1	44	4	11	6	7	11	4	29	1.52
Total . . .	556	10	56	132	4	86	6	54	10	372	1.49
In both fields	1,449	45	32	289	5	239	6	73	20	855	1.69

TABLE IV.

Exhibiting the Color, Sex, and Ages of those Dying during five years, 1852–56, of Cholera; with the Month of Death.

COLOR.	SEX.	MONTHS.												TOTAL.	AGES.											
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Unknown.		Under 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	Unknown.
White	Males	1	1	1	4	13	48	135	66	31	29	19	2	4	354	60	25	13	11	76	65	38	24	24	10	8	...
"	"	1	...	...	...	1	5	1	5	1	3	...	1	1	19	9	1	...	...	2	2	...	1	1	2	...	1
"	"	3	...	7	1	5	76	79	18	23	16	9	2	5	244	23	10	8	19	49	48	34	26	16	3	3	5
"	"	...	2	2	3	7	11	52	94	19	11	...	...	1	202	34	10	3	9	36	36	34	19	16	4	...	1
"	"	...	...	...	...	...	...	4	1	2	...	1	...	...	8	3	...	...	...	1	1	2	1	...	...	...	...
"	Females	1	1	1	...	10	31	83	37	21	13	5	...	5	208	45	16	11	12	36	31	14	18	9	8	3	5
"	"	1	1	...	...	...	3	10	2	1	3	...	2	...	23	10	4	1	...	...	1	1	2	2	...	1	1
"	"	2	...	1	6	5	39	43	20	4	11	5	1	2	139	20	10	8	7	23	25	18	7	12	4	2	3
"	"	...	1	2	2	...	10	48	48	15	3	1	...	1	131	32	10	2	11	20	15	14	10	9	5	1	2
"	"	...	...	...	...	...	1	2	1	...	...	...	...	...	4	1	...	...	...	...	...	2	1	...	...	...	...
	Total	9	6	14	16	41	224	457	292	117	89	40	8	19	1332	237	86	46	69	243	224	157	109	89	36	18	18
Black	Males	...	...	...	...	3	15	34	12	9	14	5	...	1	93	15	6	4	3	16	18	14	9	4	...	3	1
"	"	...	2	...	...	...	...	2	1	...	...	...	1	...	6	4	...	...	...	2	...	...	...	...	...	...	...
"	"	...	...	1	2	3	25	33	10	10	7	8	3	1	103	11	7	4	4	17	17	13	15	9	3	2	1
"	"	...	...	...	1	1	5	23	63	7	2	2	...	2	106	18	6	4	12	27	10	10	10	6	2	1	...
"	"	...	...	...	...	...	...	...	1	1	...	...	...	...	2	...	...	...	...	...	1	...	...	...	...	...	1
"	Females	2	...	...	1	2	9	21	9	8	5	2	1	3	63	12	4	6	3	10	6	6	7	6	2	...	1
"	"	...	...	...	...	...	...	...	1	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...
"	"	...	...	...	2	1	22	28	10	4	6	1	...	2	76	15	5	4	3	15	12	5	7	6	4	...	...
"	"	...	...	...	...	1	2	13	32	7	2	...	...	1	58	15	5	2	4	8	7	5	7	2	1	1	1
"	"	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	...	...	...
Total . . .		2	2	1	6	11	78	154	140	46	36	18	5	10	509	91	33	24	29	95	71	54	55	33	12	7	5
Both races . .		11	8	15	22	52	302	611	432	163	125	58	13	29	1841	328	119	70	98	338	295	211	164	122	48	25	23

TABLE V.

Exhibiting the Color, Sex, and Ages of those Dying in Kentucky for five years, 1852–56, *of Croup, with the Month of Death.*

COLOR.	SEX.	MONTHS.													TOTAL.	AGES.											
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Unknown.		Under 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	Unknown.
White	Males	24	10	18	12	11	8	15	26	17	21	20	20	5	207	189	7	2	1	1	...	...	...	...	...	...	7
"	"	16	10	15	8	8	14	7	13	13	19	15	23	2	163	148	8	...	2	...	...	...	...	...	...	...	5
"	"	13	15	14	18	11	18	22	22	28	34	25	27	4	251	226	18	1	...	1	...	...	...	...	...	...	5
"	"	19	12	17	17	11	11	15	15	27	26	20	23	5	218	191	18	2	4	...	...	...	...	...	...	...	3
"	"	19	17	17	13	15	9	5	20	20	16	31	26	3	211	194	11	1	...	1	1	...	...	1	...	...	2
"	Females	9	18	7	9	9	7	8	18	16	22	20	18	4	165	145	10	1	2	...	...	...	...	...	...	...	7
"	"	8	13	11	7	10	13	16	7	12	16	18	15	4	150	125	17	4	...	...	...	...	...	...	...	...	4
"	"	12	19	13	8	10	15	14	18	25	18	20	16	1	189	176	7	2	1	1	....	...	...	...	...	...	2
"	"	12	17	9	12	8	12	4	6	22	16	20	20	1	159	130	18	5	...	1	...	...	1	...	...	...	4
"	"	18	6	13	4	5	6	16	20	13	17	20	19	3	160	135	15	1	...	2	1	...	...	1	...	...	5
	Total	150	137	134	108	98	113	122	165	193	205	209	207	32	1873	1659	129	19	10	7	2	...	1	2	...	...	44
Black	Males	1	2	6	5	3	2	...	3	8	7	4	2	3	46	42	3	1	...	...	...	...	...	...	...	...	...
"	"	4	6	2	5	7	1	1	1	6	2	1	...	2	38	36	1	...	...	...	...	...	...	...	...	...	1
"	"	2	1	6	7	7	7	4	1	1	5	6	6	4	57	47	5	2	...	1	...	1	...	...	...	...	1
"	"	4	6	6	5	4	3	4	2	3	5	5	10	...	57	48	8	1	...	...	...	...	...	...	...	...	...
"	"	3	7	1	5	3	2	1	8	5	3	7	8	1	54	47	5	1	...	...	...	...	...	...	...	...	1
"	Females	1	...	2	3	4	3	...	5	2	3	4	4	...	31	27	2	1	...	...	...	1	...	...	...	...	...
"	"	2	3	1	3	1	3	3	2	2	3	4	7	2	36	32	...	1	...	...	1	...	...	...	...	...	2
"	"	5	3	...	5	1	8	3	3	4	4	11	4	3	54	47	4	1	...	...	...	...	...	...	...	...	2
"	"	2	3	2	2	1	5	3	3	2	3	5	8	1	40	31	5	...	...	1	1	...	...	...	...	...	2
"	"	11	2	2	3	4	2	5	4	5	4	6	4	2	54	49	1	1	...	...	...	...	...	...	...	...	3
Total		35	33	28	43	35	36	24	32	38	39	53	53	18	467	406	34	9	...	2	2	2	...	...	...	...	12
Both races . .		185	170	162	151	133	149	146	197	231	244	262	260	50	2340	2065	163	28	10	9	4	2	1	2	...	...	56

TABLE VI.

Exhibiting the Color, Sex, and Age of those Dying of Dysentery in Kentucky, for five years, 1852–56, and the Month of Death.

COLOR.	SEX.	MONTHS.													TOTAL.	AGES.												
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Unknown.		Under 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	Unknown.
White	Males	5	6	6	9	6	17	125	274	189	82	49	15	14	797	387	147	69	34	49	21	11	22	14	13	10	20
"	"	3	6	3	3	6	31	106	113	58	26	6	3	9	373	185	69	26	24	32	5	8	11	5	3	1	4
"	"	8	7	8	8	11	55	154	213	182	155	94	33	28	956	508	150	82	35	55	31	17	24	24	14	12	4
"	"	4	3	5	7	7	16	64	114	89	47	14	5	3	378	199	60	35	18	19	12	9	9	4	6	4	3
"	"	...	4	3	12	3	16	55	147	119	68	30	12	6	475	169	180	31	25	22	11	10	7	6	6	5	3
"	Females	10	3	9	9	5	23	111	262	186	101	43	13	15	790	345	118	76	50	54	32	29	19	28	16	1	22
"	"	5	6	6	3	5	14	106	118	65	28	8	3	6	373	153	53	35	32	31	17	17	23	4	5	1	2
"	"	3	6	5	4	7	50	142	247	174	135	89	35	13	910	370	152	84	59	80	34	36	30	28	20	8	9
"	"	4	4	4	6	5	17	45	128	81	51	19	9	5	378	173	48	30	21	26	17	20	17	11	7	4	4
"	"	4	4	4	2	6	7	65	128	93	58	46	10	4	431	182	51	38	20	48	27	18	17	16	4	6	4
	Total	46	49	53	63	61	246	973	1744	1236	751	398	138	103	5861	2671	1028	506	318	416	207	175	179	140	94	52	75
Black	Males	1	3	1	5	5	10	22	65	37	17	5	2	3	176	68	45	22	12	7	6	6	5	1	...	2	2
"	"	...	5	2	1	...	13	22	25	24	15	2	1	3	113	43	23	10	8	12	1	6	2	1	3	1	3
"	"	5	1	6	4	4	4	43	43	44	34	22	4	9	223	80	60	23	18	10	5	3	5	5	1	5	8
"	"	1	1	2	2	...	6	18	33	29	16	1	...	4	113	46	12	17	8	5	3	2	5	4	3	2	6
"	"	1	1	...	...	3	5	4	36	23	15	5	4	4	101	38	23	7	6	11	5	2	2	2	2	1	2
"	Females	...	1	1	1	1	3	21	37	37	12	1	4	5	124	49	32	10	8	9	8	1	2	1	...	2	2
"	"	1	4	3	1	1	11	27	29	12	5	1	...	6	101	43	13	11	4	10	7	1	2	2	1	...	7
"	"	2	2	...	2	3	12	31	47	22	30	11	1	8	171	63	36	17	5	16	7	5	8	2	3	4	5
"	"	...	1	1	...	...	2	12	15	20	9	3	...	2	65	27	9	5	6	7	2	4	1	1	...	...	3
"	"	1	2	...	2	...	2	10	18	19	8	1	4	3	70	35	13	6	3	3	1	3	...	2	1	1	2
Total . . .		12	21	16	18	17	68	210	348	267	161	52	20	47	1257	492	266	128	78	90	45	33	32	21	14	18	40
Both races .		58	70	69	81	78	314	1183	2092	1503	912	450	158	150	7118	3163	1294	634	396	506	252	208	211	161	108	70	115

TABLE VII.

Showing the Color, Sex, and Age of those Dying of Continued Fever in Kentucky, for five years, 1852–56, and the Month of Death.

COLOR.	SEX.	MONTHS.													TOTAL.	AGES.												
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Unknown.		Under 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	Unknown.
White	Males	17	23	23	26	18	16	23	30	51	46	30	38	11	352	40	20	27	47	96	39	35	22	12	4	2	8
"	"	13	19	20	13	15	11	17	19	22	32	20	16	...	217	24	16	13	33	70	21	12	10	7	4	2	5
"	"	11	9	15	15	15	15	24	37	29	40	33	34	7	284	45	20	18	31	73	40	16	15	11	7	2	6
"	"	10	11	12	19	9	12	19	37	27	54	21	15	5	251	26	17	17	41	73	29	16	13	11	6	1	1
"	"	13	4	11	10	6	12	14	23	26	38	23	16	4	200	24	19	12	22	43	21	19	17	14	7	1	1
"	Females	19	16	19	13	21	8	21	24	41	37	39	22	6	286	29	21	33	49	66	27	17	20	14	4	...	6
"	"	10	15	22	13	13	7	18	34	24	20	11	10	2	199	20	13	23	30	54	15	17	13	10	1	...	3
"	"	13	19	16	13	11	12	20	26	36	43	27	31	6	273	44	16	22	38	60	31	22	16	9	6	2	7
"	"	4	10	10	17	12	16	25	28	42	33	8	14	2	221	21	17	21	35	55	21	17	16	11	1	2	4
"	"	11	9	12	15	7	6	11	15	19	20	21	11	7	164	23	9	13	34	51	16	5	7	2	3	...	1
	Total	121	135	160	154	127	115	192	273	317	363	233	207	50	2447	296	168	199	360	641	260	176	149	101	43	12	42
Black	Males	8	11	10	19	9	5	18	14	18	11	13	10	4	150	19	12	13	32	42	14	7	5	3	...	...	3
"	"	8	4	5	3	9	6	5	8	3	8	4	4	7	74	7	10	7	11	19	8	5	4	1	1	...	1
"	"	8	4	10	1	9	3	4	10	7	12	12	6	2	88	6	4	9	14	28	15	7	...	1	...	...	4
"	"	3	5	4	2	5	4	6	10	12	8	6	5	...	70	9	6	13	14	16	2	2	4	1	...	...	3
"	"	4	3	...	3	1	1	5	13	12	6	6	11	3	68	7	8	8	12	15	5	9	...	2	...	...	2
"	Females	15	11	8	14	7	12	16	9	12	11	12	9	1	137	20	15	26	27	20	14	8	4	2	1	...	...
"	"	3	7	4	1	7	4	7	8	10	9	2	3	4	69	5	6	8	13	13	11	6	3	...	1	...	3
"	"	2	5	3	2	4	5	7	6	10	8	5	10	1	68	9	5	8	15	15	9	3	2	...	1	...	1
"	"	7	5	5	6	7	6	5	8	11	8	6	4	...	78	5	7	8	17	15	13	6	3	1	1	...	2
"	"	2	3	3	4	5	3	6	14	7	11	6	3	1	68	13	4	9	15	12	8	2	2	3	...	...	...
Total . . .		60	58	52	55	63	49	79	100	102	92	72	65	23	870	100	77	109	170	195	99	55	27	14	5	...	19
Both races .		181	193	212	209	190	164	271	373	419	455	305	272	73	3317	396	245	308	530	836	359	231	176	115	48	12	61

TABLE VIII.

Exhibiting the Color, Sex, and Ages of those Dying in Kentucky of Fever, during five years, 1852–56, with the Month of Death.

COLOR.	SEX.	MONTHS.													TOTAL.	AGES.												
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Unknown.		Under 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	Unknown.
White	Males	6	8	6	5	7	15	11	34	19	22	12	12	5	162	47	20	12	13	32	11	10	6	2	7	...	2
"	"	9	12	12	14	9	3	11	18	18	11	10	12	9	148	34	23	13	16	20	10	11	5	10	3	1	2
"	"	5	5	7	8	2	7	18	22	24	17	19	17	3	154	50	18	6	15	23	13	4	8	13	3	...	1
"	"	6	8	7	13	17	16	21	35	46	33	12	9	...	223	71	20	18	12	32	21	19	9	9	4	4	4
"	"	4	3	6	5	7	4	12	22	26	11	8	8	...	116	47	9	1	9	16	7	13	4	3	2	4	1
"	Females	12	6	10	11	7	5	18	23	31	18	19	14	12	186	38	13	12	25	42	16	16	8	4	6	1	5
"	"	7	12	12	14	11	8	13	17	17	18	12	10	3	154	33	14	14	24	27	14	11	8	2	4	2	1
"	"	4	11	9	9	9	6	21	18	32	27	22	17	5	190	48	17	14	12	40	16	14	9	13	5	...	2
"	"	8	8	8	13	20	7	10	27	34	31	8	10	2	186	51	11	13	17	25	22	10	14	11	7	3	2
"	"	3	2	6	3	8	6	6	19	17	16	5	6	8	100	22	7	5	10	22	11	12	3	3	2	2	1
	Total	64	75	83	95	97	77	141	235	264	204	127	115	42	1619	441	152	108	153	279	141	120	74	70	43	17	21
Black	Males	2	1	4	3	3	1	1	4	4	6	4	1	4	38	9	6	2	4	8	4	...	1	...	1	...	3
"	"	1	2	3	6	1	1	3	4	3	5	5	2	1	37	8	5	3	8	4	1	2	2	3	...	...	1
"	"	3	3	2	5	2	2	4	10	4	9	1	3	2	50	16	4	1	6	13	3	6	...	...	1	...	...
"	"	1	5	3	3	1	3	3	8	10	5	4	1	2	49	16	8	...	2	9	3	2	2	3	2	...	2
"	"	5	1	2	...	2	1	1	2	3	5	1	...	...	23	5	6	1	3	5	...	1	1	...	...	...	1
"	Females	2	5	4	...	3	1	2	7	2	3	4	3	2	38	5	4	5	6	4	4	5	1	2	1	1	...
"	"	1	1	2	4	2	2	6	4	3	5	2	...	2	34	4	3	2	4	7	3	5	2	3	1	...	...
"	"	1	2	2	3	5	2	5	11	3	6	2	3	4	49	14	4	5	4	10	3	3	3	1	...	...	2
"	"	1	2	3	8	1	3	5	5	9	7	6	1	1	52	14	11	6	7	8	4	...	...	2	...	...	...
"	"	...	...	1	1	2	...	3	6	6	3	2	1	...	25	8	1	3	3	5	4	...	...	...	...	...	1
Total . . .		17	22	26	33	22	16	33	61	47	54	31	15	18	395	99	52	28	47	73	29	24	12	14	6	1	10
Both races .		81	97	109	128	119	93	174	296	311	258	158	130	60	2014	540	204	136	200	352	170	144	86	84	49	18	31

TABLE IX.

Exhibiting the Color, Sex, and Ages of those Dying of Scarlet Fever in Kentucky, for five years, 1852–56, with the Month of Death.

COLOR.	SEX.	MONTHS.													TOTAL.	AGES.												
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Unknown.		Under 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	Unknown.
White	Males	7	3	3	5	4	4	2	3	2	7	2	3	...	45	26	17	...	...	1	...	...	...	1	...	...	...	...
"	"	15	12	20	6	9	6	4	7	10	15	11	16	4	135	86	32	8	3	2	...	...	1	...	1	...	2
"	"	17	24	19	12	13	10	9	13	12	15	18	22	4	188	132	38	11	4	...	2	...	1	...	...	...	...
"	"	14	28	16	25	26	17	21	20	12	13	6	12	5	215	116	65	16	9	4	1	1	1	...	...	1	1
"	"	7	2	10	10	5	12	2	13	14	15	16	11	3	120	83	20	3	6	5	2	...	...	...	...	...	1
"	Females	1	1	7	3	2	1	2	2	5	4	2	7	...	37	24	8	3	1	1	...	...	...	...	...	...	...
"	"	7	20	15	11	9	6	4	6	6	7	16	13	1	121	71	34	7	5	2	...	1	...	...	...	...	1
"	"	22	19	15	11	17	14	11	12	11	16	21	22	4	195	116	47	18	7	5	1	1	...	...	...	...	...
"	"	20	19	27	25	32	14	13	12	15	18	9	9	1	214	109	51	23	7	7	7	1	1	...	1	...	7
"	"	10	9	10	10	8	9	2	8	12	16	8	18	2	122	75	30	11	2	3	1	...	...	...	...	...	...
	Total	120	137	142	118	125	93	70	96	99	126	109	133	24	1392	838	342	100	44	30	14	4	4	1	2	1	12
Black	Males	2	...	...	1	...	1	...	1	1	...	3	1	2	12	8	2	...	1	...	...	...	...	...	...	...	1
"	"	1	4	...	...	6	3	...	1	1	1	...	...	3	20	13	5	1	1	...	...	...	...	...	...	...	...
"	"	2	8	2	4	1	1	...	...	1	3	2	4	3	31	23	2	3	2	1	...	...	...	...	...	...	...
"	"	5	...	9	7	10	...	5	1	4	2	4	1	...	48	30	14	3	...	...	...	...	...	...	...	...	1
"	"	1	2	2	1	1	...	...	1	...	2	4	5	...	19	14	3	1	...	...	...	1	...	...	...	...	...
"	Females	3	1	1	...	...	1	...	...	2	...	2	3	1	14	3	6	1	2	1	...	...	...	...	...	...	1
"	"	5	1	1	4	8	3	...	...	1	1	1	2	1	28	13	11	1	2	...	...	...	...	...	...	...	1
"	"	2	3	2	6	3	1	1	2	2	2	2	4	2	32	16	10	2	...	1	1	...	1	...	...	...	1
"	"	2	4	10	5	4	1	1	3	2	...	2	2	...	36	21	12	2	...	...	...	...	...	...	...	...	1
"	"	...	2	4	...	3	3	3	1	2	2	4	3	...	27	16	7	1	3	...	...	...	...	...	...	...	...
Total . . .		23	25	31	28	36	14	10	10	16	13	24	25	12	267	157	72	15	11	3	1	1	1	...	...	...	6
Both races .		143	162	173	146	161	107	80	106	115	139	133	158	36	1659	995	414	115	55	33	15	5	5	1	2	1	18

TABLE X.

Exhibiting the Color, Sex, and Ages of those Dying of Hooping Cough in Kentucky, for five years, 1852–56, with the time of Death.

COLOR.	SEX.	MONTHS.													TOTAL.	AGES.												
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Unknown.		Under 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	Unknown.
White	Males	7	4	7	11	7	11	9	4	5	12	9	9	1	96	80	11	1	3	...	...	...	1	...	...	...	...
"	"	6	2	5	1	3	3	3	4	10	4	7	5	...	53	44	5	1	...	1	...	...	...	...	1	...	1
"	"	3	4	8	7	5	...	2	14	3	5	5	5	2	63	55	7	...	...	...	1	...	...	...	...	...	...
"	"	1	2	4	...	2	7	7	13	8	12	6	5	...	67	60	5	...	...	...	...	...	2	...	...	...	...
"	"	...	2	5	...	4	5	5	11	7	4	1	7	1	52	42	4	5	...	...	...	...	...	...	...	...	1
"	Females	6	4	9	8	7	5	11	14	14	9	8	11	2	108	93	10	2	2	...	...	...	...	...	...	...	1
"	"	2	4	6	6	3	1	10	10	6	4	4	2	...	58	51	4	...	1	1	...	...	...	...	...	...	1
"	"	1	3	7	8	2	9	14	12	7	6	9	6	2	86	68	7	2	1	2	1	4	1	...	...	...	...
"	"	5	6	6	5	3	7	5	12	15	9	8	3	1	85	72	8	2	...	1	2	...	...	...	...	...	...
"	"	3	4	4	7	5	4	7	12	6	7	7	7	3	76	64	7	...	3	1	...	...	...	...	...	...	1
	Total	34	35	61	53	41	52	73	106	81	72	64	60	12	744	629	68	13	10	6	4	4	4	...	1	...	5
Black	Males	3	3	3	7	4	7	3	11	8	4	5	6	1	65	51	8	1	2	...	...	...	...	...	...	...	3
"	"	5	2	2	...	2	1	2	3	1	4	1	1	3	27	21	2	3	...	...	...	...	...	...	...	...	1
"	"	2	3	6	2	...	2	7	8	3	2	3	1	...	39	33	1	...	...	1	1	...	...	...	...	...	3
"	"	...	1	4	...	4	1	6	4	3	4	2	8	...	37	32	3	...	...	1	...	...	...	...	...	...	1
"	"	...	6	7	3	1	4	1	2	3	2	1	...	2	32	25	4	1	1	...	...	...	...	...	...	...	1
"	Females	2	1	10	4	5	4	5	3	5	5	6	4	3	57	43	7	2	1	1	...	...	1	...	...	...	2
"	"	3	3	1	3	...	6	4	4	5	3	2	3	4	41	33	3	1	...	...	...	...	...	...	...	...	4
"	"	...	4	4	3	4	4	1	1	2	...	2	2	1	28	21	2	3	1	...	...	...	...	...	...	...	1
"	"	1	2	3	2	6	2	2	1	2	6	5	7	...	39	28	5	2	2	1	...	...	...	...	...	...	1
"	"	1	3	6	3	4	8	6	6	3	2	3	...	1	46	38	4	1	...	...	...	...	...	...	...	...	3
Total . . .		17	28	46	27	30	39	37	43	35	32	30	32	15	411	325	39	14	7	4	1	...	1	...	...	...	20
Both races .		51	63	107	80	71	91	110	149	116	104	94	92	27	1155	954	107	27	17	10	5	4	5	...	1	...	25

REPORT

ON THE

TOPOGRAPHY AND EPIDEMIC DISEASES

OF

NEW JERSEY,

AND THE

TREATMENT THEREOF.

BY

LYNDON A. SMITH, M.D.

REPORT ON THE TOPOGRAPHY AND EPIDEMIC DISEASES OF NEW JERSEY, AND THE TREATMENT THEREOF.

THE undersigned, appointed by this Association, in 1855, to report "On the Medical Topography and Epidemic Diseases of New Jersey, and the Best Method of Treatment," respectfully represents:—

That immediately after his appointment, he addressed a circular letter, through the newspapers and the *Medical Reporter*, to the physicians of New Jersey, stating that such a committee had been appointed, as well as the object in view, and asking from them such information as might enable him to make a full and satisfactory report. He also made application to the New Jersey Medical Society for assistance, but up to the present moment has received no response to his appeals, and is, therefore, dependent upon his own limited observation, and the annual reports of the Standing Committee of the New Jersey Medical Society, as published in the *Medical Reporter*, together with the *Report of the Geological Survey*, under Dr. Kitchell, and also *Gordon's Gazetteer*. To these sources he hereby acknowledges himself indebted for the facts embodied in this report.

TOPOGRAPHY.—The State of New Jersey lies between the parallels of 40° 20′ and 38° 55′ north latitude, and meridians 73° 54′ and 75° 34′ west longitude from Greenwich.

It occupies a position peninsulated, with respect to New York, which bounds it on the north, and from which it is separated by an imaginary line running nearly on the 41st parallel of north latitude to the Delaware River. On the east, the boundary line follows the Hudson River until it empties into the Bay of New York, thence it follows the strait which separates the State from Staten Island. The remainder of the eastern and southeastern boundaries

is formed by the Atlantic Ocean. The Delaware River forms the western and southwestern boundary, separating the State from Pennsylvania and Delaware.

The total area is 7,750 square miles, being 4,960,595 acres, of which only 1,767,991 are improved, leaving entirely uncultivated 3,192,604. And yet there are no deserts, nor dismal swamps, where the labor of man would not receive an adequate reward. The inhabitants of the State are settled principally in valleys, on the rivers and brooks, where the land is rich and easily cultivated. Hence it happens, that the most prevalent diseases are of malarious origin. As the land is drained and cultivated, the country gradually becomes more healthy, so that our bills of mortality compare very favorably with those of any of the United States.

The area of the State is naturally divided into three strongly marked sections. The *first division*, the alluvial, between Delaware Bay and the Ocean, includes the marl region, and is almost a level plane, much of it dense forest, and, where cultivated, is devoted to the raising of the grasses, grains, and fruits, which are produced in great abundance. The climate is so mild near the sea-coast, that cattle often subsist upon the meadows and in the neighboring woods, through the winter, without being sheltered or fed.

The streams, of which there are a great number, have so slight a descent, that in many places they may almost be regarded as a succession of swamps and ponds, forming a striking contrast to other portions of the State. The section comprises the counties of Monmouth, Burlington, Gloucester, Salem, Cumberland, Cape May, and Atlantic, and it has evidently been reclaimed from the Ocean.

The *second division*, the hilly, is included by a line drawn from Hoboken, south, to Trenton, and another drawn from the Ramapo Mountains, curving by the Pompton Mountain to Delaware River, between Alexandria and Milford, and affords a considerable variety of soil and surface, the geological formation being secondary, or chiefly red sandstone. This division includes a large part of Bergen, Hudson, and Passaic counties, all of Essex, part of Morris, Somerset, Hunterdon, and Middlesex. This is the most populous, and probably most wealthy portion of the State. While the soil is not so productive as in the primitive and transition regions, there being less of it waste, and divided as it is into small farms, and more assiduously cultivated under the stimulus of convenient markets, the returns are very abundant. The manufacturing in-

terests in the State are principally confined to this section, and add greatly to its wealth and importance.

The *third*, or *mountainous division*, which is from ten to forty miles in breadth, extends from the northwest boundary of the State, in a southwesterly division to the Delaware Water Gap; where it passes into Pennsylvania. This district is very interesting and varied in its geological formation, surface, soil, mineral, and vegetable productions. The primitive ridges contain rocks of a pretty uniform character, as quartz, feldspar, &c.

In the transition section, grauwacke and grauwacke slate are the most common rocks. Extensive beds of magnetic iron ore, and also zinc and copper are found.

The most remarkable mountain range, in this division, is that called the Blue Mountains. This range is from 800 to 1500 feet in height, and from three to six miles in width at the base. Between the western slope and the Delaware River is a valley averaging one mile in width, drained by the Flatkill and its branches. East of the Blue Mountains lies a broad and fertile valley, called the Kittating, and extending, through the counties of Sussex and Warren, forty miles to the Delaware River. It is broken by a succession of rounded hills, which cause the drainage of the northern portion to pass through the Wallkill northerly towards the Hudson, while the southern portion is drained by the Paulins Kill into the Delaware. Both streams are fed by small lakes and ponds, which are so numerous that they often cause the Wallkill to overflow its banks, destroying the fertility of a large tract of country, and rendering it unhealthy.

The next remarkable range in this section is a continuation of the Highlands of New York, which take the same general direction as the Blue Mountains. They are not as continuous as the latter, and as they are made up of parallel ridges, intersected by occasional valleys, have different names in different localities.

Within this range are several large and beautiful lakes, and many small ponds, affording the waters which make up many of our principal rivers, as the Raritan, which runs easterly for seventy-two miles, and empties into the Bay of the same name. The Passaic, which, after running about seventy miles, empties into Newark Bay. The Hackensack, forty miles in length, also empties into Newark Bay. The Pequest, thirty miles in length, empties into the Delaware. This is a bold and rapid stream, affording abundance of water power, and draining a very fine valley.

The Musconetcong is the outlet of Lake Hopatcong, and runs forty miles, in a southerly direction, through a deep and narrow valley, and empties into the Delaware. Lake Hopatcong is five and a half miles in length, and one and a half wide, and is the feeder of the Morris Canal, containing nearly four and a half square miles of water.

There are many other streams draining smaller valleys, between mountain ridges, and forming branches of the Raritan or the Passaic, which time will not allow me to particularize.

The mountains in this section, with some exceptions, are generally in a state of nature, while the valleys, based on limestone, form the most fertile portions of the State, and are generally in a high state of cultivation, and thickly inhabited.

EPIDEMIC DISEASES.—During the three years of the existence of this commission, it will be seen by the following extracts from the Reports of the Standing Committee of the New Jersey Medical Society, that the State has been remarkably healthy. The Committee for the year 1855 say, in their Report to the Society in January, 1856, as published in the *New Jersey Reporter:*—

"No epidemic has prevailed, to any extent, in our State during the past year; such as approached that character were generally limited to small portions of the State. Among these, scarlatina, whooping-cough, measles, diarrhœa, dysentery, mumps, and bilious fever have had a share; also a very troublesome disease of the skin."

The Committee for the year 1856, say:—

"The general prevalence of health throughout the State, and its immunity from extended epidemics, affords but little material upon which to report in this department of medical research." The diseases mentioned as prevailing are nearly the same as during the last year.

The Committee for the year 1857, say:—

"In presenting their annual Report, your Committee feel great gratification in being able to announce that the citizens of our State have, during the past year, enjoyed an unusual exemption from the various ills that flesh is heir to. We have been spared from any of those pestilential epidemics which, at times, have swept over our land, destroying our fellow beings by scores and hundreds, and desolating hearth-stones.

"It is our pleasing duty to report that, while seed-time and harvest have prospered, Hygeia's sway is now, and has been during

the past year, more than usually absolute, and that we are at present in a remarkably happy condition of health and prosperity."

The Committee allude to the remarkable financial epidemic which lately visited our country, as having had a peculiarly debilitating effect upon the medical profession, causing long faces and lank purses.

The diseases mentioned as epidemics, during the year, are the same as those reported for the two preceding years. Erysipelas alone is particularized as having been "wide spread, insidious, and fatal" in our locality, Gloucester County.

The Committee present the following conclusions of Dr. Van Doren, relating to the diseases of Somerset County, and probably equally well applied to some other portions of the State.

"True sthenic inflammation is becoming more rare yearly, and the cases which do occur are of a milder grade."

"The phlegmasia are replaced to a considerable degree by diseases of irritation, viz., neuralgia, nervous gout, and subacute rheumatism."

"Inflammatory action is attended with less symptomatic fever than formerly; thus we often see (latent) pleuritis, pneumonia, &c."

"The cause of these peculiarities is doubtless that our population have their vascular and muscular systems *less*, and their nervous systems *more* developed, than their ancestors, and the cause of this difference is to be found in their habits of life."

"In relation to fevers the following facts appear. Intermittents have been increasing for the past ten years, and are in some localities very annoying."

"At the same time, bilious remittent (also, they say, miasmatic) has dwindled and almost disappeared, and intermittent fevers often ally themselves with and run into typhoid (the enteric fever of Wood)."

"Typhoid fever has become endemic among us, and typhus, *i. e.*, typhus gravior, has almost if not quite disappeared."

"Irritative fever, the febris ephemera of Goode, is often met with in children, and is almost the only form of remittent fever commonly encountered."

"In relation to the treatment of typhoid fever, an expectant practice, with careful control of the local complications, as they arise, has generally proved successful. The turpentine emulsion of Dr. Wood is most efficient in controlling the abdominal symptoms."

SCARLATINA has prevailed more extensively in the State than any other epidemic, in all its forms, from the mildest to the most malignant. Great difference of opinion prevails respecting its treatment in the severer forms, while all agree that in its simplest, little more is required than confinement to the house, and regulation of the diet and bowels.

In the anginose variety of this disease, the best practice seems to be that suited to many cases of continued fever at their commencement, the antiphlogistic. Where there is heat of skin, cold affusion, or at least cold sponging, is very advantageous. When the tonsils become inflamed and swollen, and the cerebral circulation is disturbed, as indicated by delirium, the application of cold to the head, and leeches to the throat, is found to be useful. But great care is necessary not to do *too much.*

In the malignant form of this disease, all agree that every method of treatment too often fails, and that almost the only chance for the patient, is in the use of tonics and stimulants, occasionally pencilling the gangrenous ulcerations of the throat with nitrate of silver and detergent gargles.

At the suggestion of Dr. Nebinger, of Philadelphia, in the *New Jersey Med. Reporter* for Dec., 1857, I have recently tried, in several cases of this disease, with pleasing effect, chlorine, prepared after the following formula. Dissolve two drachms of chlorate of potash, in a mixture of two ounces each, of hydrochloric acid and pure water. The water absorbs the chlorine which is generated, and becomes highly charged with it. The mixture must be made in a close-stoppered bottle, and kept from the light. Of this, half a drachm is mixed with four ounces of syrup and water, and a tablespoonful or less, according to age, is given every hour or two, according to the urgency of the symptoms.

After clearing the primæ viæ, this remedy, with the use of detergent gargles and nitrate of silver to the tonsils, has done in my hands better than any other, and I would respectfully urge the profession to give it a fair trial.

Diphtheritic croup is very frequently an attendant on this disease, and is generally fatal. When otherwise, the favorable issue is generally owing to the free use of nitrate of silver topically applied, according to the plan of Dr. Green, and the internal administration of calomel.

INTERMITTENT, REMITTENT, and TYPHOID FEVERS have prevailed to some extent in many localities as epidemics, and have greatly taxed the patience of both physician and subject. I am not aware that anything new has been discovered in the treatment of these diseases, or that the confidence of the faculty in the old methods is at all abated.

Many physicians prefer quinoidine to quinine, in the treatment of intermittents, as being more permanent in its effects. My own practice is to combine carbonate of iron with quinine, and it seldom disappoints my expectations in making a radical cure.

Some speak in high terms of the veratrum viride in those febrile affections characterized by excessive action of the heart and arteries. The method of using this article is to commence with six drops of Norwood's tincture, for an adult, and increase one drop each dose, every three hours, till a decided effect is produced upon the system, evinced by diminution in the frequency of the pulse, or by nausea and vomiting, when the dose is reduced to six drops, and continued as before.

I have prescribed this remedy with pleasing effects, and do not hesitate to recommend it as preferable to those usually resorted to for the same general purpose.

I will here add, that Dr. Johnson, of Hunterdon County, who has had considerable experience in the use of veratrum, says: "In all cases of exalted arterial action, and when the circulation needs bridling, we have in the veratrum viride a resource which puts the lancet, tartar emetic, and digitalis far in the background."

Dr. Gibbon, of Salem County, also speaks in commendation of the article, and says: "I am inclined to think that, in some instances at least, it may be used as an efficient substitute for the lancet."

DYSENTERY has not prevailed very extensively as an epidemic in the State, during the past three years, but has occurred in some localities with greater or less severity.

Dr. Coleman, of Burlington County, says, "that the cases of this disease in that region last year, were marked by early prostration and rapid tendency to dissolution." He does not mention the particular method of treatment.

Dr. Johnson, of Hunterdon, says "that, during the months of July and August, this disease prevailed so extensively in that county as to be an epidemic. The attacks were severe but amena-

ble to medicine." He commenced the treatment with castor oil, of which he seldom found it necessary to give more than one or two doses. "The great principle kept in view in the treatment, was to maintain the bowels as much as possible at rest."

He used Dover's powder in the usual doses, and, in many cases, added to each, say every three or four hours, a teaspoonful of the solution of plumb. acetatis, four grs. to the ounce of water.

The opium suppository, two grs. for an adult, was used at bed-time, in cases of tenesmus. Poultices of mush, and bread and milk, to the abdomen, had a pleasing effect, as had also the sinapism occasionally. The diet was liquid, consisting of soups, and sweet milk and bread. This treatment, he says, subdued the disease in a brief period.

Dysentery has prevailed also in this city and vicinity with some severity, but has been manageable under a treatment similar to the above.

MEASLES has made its appearance in some portions of the State.

Dr. J. C. Johnson, of Warren County, says, in his report to the Standing Committee, "that this disease prevailed over a very large district of that county, in the winter and spring of 1856, and affected the greater portions of those who were unprotected by previous attacks. Their type was sthenic, devoid of malignancy, yet in most cases attended with bronchial and pulmonary complications."

Dr. Johnson found "that mild treatment, by demulcent drinks, rubefacients, and small doses of ipecac, removed all these difficulties, without recourse to the lancet, blisters, or antimony."

Dr. Phillips, of Trenton, speaks of the disease as having prevailed there in Jan., 1857, and that it required strict antiphlogistic treatment.

It also has prevailed to some extent in Essex County, existing in many instances in families where the scarlet fever was at the same time prevalent. It was not particularly fatal, generally giving way to the usual plan of treatment.

ERYSIPELAS is one of the epidemics of the past three years. It prevailed extensively in Mercer County in 1857. In the report of the Standing Committee to the Medical Society, it is stated "that the constitutional symptoms were very severe and distressing, and the disease attacked every age, sex, and condition. Many

deaths occurred among parturient females, the disease associating itself very insidiously with puerperal peritonitis, and proving extremely unmanageable." The treatment consisted in the internal use of tonics (generally some preparation of Peruvian bark), and the external use of nitrate of silver and tincture of iodine.

Dr. Graham, of Gloucester, says: "The disease prevailed throughout that county, and many a memory will often, and with sadness, recall its ravages during the winter of 1856–7."

"Accompanying this epidemic, was an obscure form of inflammation, as to the exact character of which different opinions obtained among our most experienced practitioners."

"This disease was so similar to erysipelas as either to be the same, or, at least, its cousin-german." Dr. G. asks, "whether there is such a thing as internal erysipelas? Is it or not a disease diagnosed by cutaneous inflammation, and from which mucous tissues are exempt?"

Dr. Newkirk, of Cumberland, reports to the Medical Society, 1856, that an anomalous CUTANEOUS AFFECTION had prevailed in that county, which was attended with intense itching and smarting, and when irritated by scratching, running into ulcerations, having been at first vesicular. It resembled scabies, and yielded at last, after running a long time, to remedies appropriate to that disease. It was seldom noticed on or between the fingers, but sometimes appeared on the forehead and face. It went through whole families often, but not always. Some thought it contagious, others not. Sarsaparilla, iodide of potash, and Fowler's solution, were all used internally with benefit; externally, all the usual ointments and the laurel bath.

Dr. Bateman, of Cedarville, mentions, in the *N. J. Medical Reporter*, that the same disease has prevailed in his vicinity for several years. He thinks it evidently contagious, and says no grade or class of society, from the highest to the lowest, is exempt from its attacks.

His description of the disease is similar to Dr. Newkirk's, and he adds, that it often returns after the patient has seemed to be cured. Dr. B. says: "After an experience of three years in the treatment of this disease, I find that the prescription which has been most efficacious, has been the internal use of the liquor potassæ arsenitis, one to eight drops, three times a day, according to the age of the patient; and the external use of a wash of bichloride

of mercury ʒj; crude sal-ammoniac ʒij; water Ojss; dissolved, and applied morning and evening."

The same disease has prevailed in Essex County extensively, also in Warren, Sussex, and Somerset counties, and gave way under the use of Fowler's solution, and the external application of a solution of sulphate of zinc, citron ointment, and a solution of the sulphuret of potash.

WHOOPING-COUGH has been epidemic in several sections of the State, but nothing new or interesting respecting the pathology or treatment of the disease has come to my knowledge. The same remark is applicable to the MUMPS, RHEUMATISM, DIARRHŒA, CHOLERA INFANTUM, and INFLUENZA, which have all visited some portions of the State, though not extensively.

SMALLPOX has been more than usually prevalent in many portions of the State, especially in Essex County, but the faith of the profession in the efficacy of vaccination, as a preventive, is in no sense weakened, but most of them believe that a *perfect* vaccination is a *perfect protection*. In my own experience this perfection is not always attained by one trial, but sometimes requires two or more; and my practice is to revaccinate, in all cases, so long as a vaccinoid effect can be produced.

That vaccination never wears out is my belief, as in my own case it has stood the test of forty-eight years, during which time I have repeatedly revaccinated myself without any other effect than a slight inflammatory action, and have very often been exposed to the most virulent forms of smallpox with impunity.

The Board of Education in this city have adopted a resolution, that no child shall be admitted into our public schools, who has not been successfully vaccinated; and arrangements are made by the city for vaccinating the poor gratuitously. Were the same plan adopted throughout the State, smallpox would soon cease to exist in all our borders.

From an experience of thirty-seven years, during which time I have been a very careful observer, the following opinions are advanced with great confidence. They were originally published in the *New Jersey Medical Reporter*, vol. x., and are here reproduced.

1st. That a *perfect* vaccination affords a *perfect* protection from smallpox during life, and that, if this is done in all instances soon

after birth, smallpox may, as Dr. Jenner supposed it would, be eradicated.

2d. That in some subjects *one* vaccination is sufficient to destroy the susceptibility to smallpox, while in others *two*, and sometimes *more*, are required, and, therefore, it is important to revaccinate as long as an impression can be made.

3d. That vaccination will protect the life, and greatly mitigate the distress of a patient, who has already taken the smallpox, if done in time to allow the first disease to pervade the system.

4th. That the common idea, that the *sorer* the arm from vaccination the better the protection, is a mistake, and that a very small pustule, which goes through the regular stages and produces a constitutional effect about the ninth day, is more generally *perfect* than one that produces great inflammation, pain, and swelling, and affects the glands. Indeed, I am always suspicious of a case when this has occurred, and take an early opportunity to revaccinate, and have often had my suspicions verified by a good pustule.

5th. That the virus should always be taken before the areola forms, if taken from the pustule, and with great caution, lest it interfere with its progress. My own practice is, to save the scab and insert it in a pulverized form by means of Faucher's vaccinator, which is a very simple and convenient instrument, and saves much time, and never produces unnecessary inflammation.

6th. That the virus should never be taken from any but a healthy infant of healthy parents, and then there is little or no danger of propagating any other disease, as many think may be and often is done.

7th. That eruptions often occur after the most careful vaccination, and are owing to some peculiar idiosyncrasy, although the friends of the patient attribute it to the virus. Hence the importance of the last observation, which may save the physician from blame.

8th. That a small scar with pits, or indentations around its border, is a much better evidence of the perfectness of vaccination than a large, smooth, and glossy one, though many think that the bigger the scar the better the vaccination.

9th. In vaccinating a patient who has a good scar, if the virus produce redness and itching for a few days, and then dries up, I infer that the first vaccination was *perfect*. If it produce no other effect than is common to a slight puncture of the skin, I infer that

the virus is not good, and immediately make another attempt with a new supply.

In conclusion, I will allude to only one other epidemic which has visited us, and this is mentioned by Dr. Butler, of Burlington, in his report to the Standing Committee for 1856, and will, in some measure, excuse the meagreness of the paper I here present, as it shows that New Jersey has been blessed with a great share of immunity from disease for the past few years.

Dr. Butler says, in January, 1857: "So far as I am aware, the only general *epidemic* that has prevailed in this county the past year, was confined to the medical profession. This disease, which has of late been made the subject of study by certain enthusiastic Southern pathologists, is known by the name of DRAPETOMANIA, a disposition *to run away from home.* I shall not at this time go into a lengthened disquisition on the causes, nature, results, pathology, course, and treatment of this disease, but will refer you for further facts, in regard to it, to elaborate essays to be found in the pages of some of our Southern journals. Suffice it to say, that the epidemic prevailed here throughout the entire season, and was characterized by its ordinary *symptom*, a strong desire to leave home. The cause of the disease was, in this instance, a uniform one, viz: *Little or nothing to do at home.* The *treatment* was emphatically 'expectant,' and the *termination* 'favorable,' for when allowed 'to run its course' it left the patient where it found him, *at home.* The most serious 'result' of this epidemic, and of the cause which has given rise to it, is the emptiness of a certain sack or pouch, in the right inguinal region. This result, however, it is hoped may be obviated by time."

Respectfully submitted,

LYNDON A. SMITH, M.D.

NEWARK, N. J., April 10, 1858.

REPORT

OF THE

COMMITTEE ON THE EPIDEMICS OF OHIO.

BY

GEORGE MENDENHALL, M.D.

REPORT OF THE COMMITTEE ON THE EPIDEMICS OF OHIO.

THE Committee on the Epidemic Diseases of Ohio, appointed in 1855, would respectfully report:—

That it has made a considerable amount of effort to procure information in respect to the character of the diseases which have prevailed during the last three years within the limits of the State, but has not been able to procure any communications bearing upon this subject from members of the profession.

A registration law was passed by the Legislature of Ohio, in 1856, for the purpose of obtaining statistics on the subject of births, deaths, and marriages, but from culpable inattention on the part of those whose duty it was to furnish blanks and collect such information, very little has been accomplished, and nothing worth reporting has come to the knowledge of the Committee.

The Committee will, therefore, not be able to add much to those reports which have already been made by the Chairman, and communicated to the Association in 1852 and 1854.

From personal intercourse, however, with a large number of physicians of the State, and from communications in the medical journals, there is no doubt but that the past three years has been a period of unusual health, with the exception of a very general prevalence of intermittent fever, and diseases of a kindred character, during the months of July, August, September, and October, 1855.

The epidemic choleraic disposition which showed itself in the latter part of the year 1848, and continued with varying degrees of intensity until 1854, has subsided, so that, during the period embraced in this report, we believe that no unusual disposition to affections of the bowels has been noticed. The ordinary diseases

incident to the country have again showed themselves unconnected with this peculiar epidemic influence; and, in the absence of statistics, we feel warranted in believing in a diminished degree, with the exception of intermittent and remittent diseases of 1855. This law, which seems to follow the appearance of all epidemics, would show that, taking a series of years together, the mortality caused by the appearance of most severe epidemics is compensated for in being followed by a corresponding diminution of sickness and mortality.

It has been already stated, that during several months of the year 1855, intermittent fever prevailed to a great extent. This was the case in nearly every portion of the State; scarcely a single locality was exempt; high and low grounds were alike visited with this disease. In places where it had usually prevailed very few escaped; while in districts where it had been an entire stranger, numerous cases occurred. In short, the influences producing this class of affections seemed to be uniformly present in every locality. The Committee is not aware that the disease presented any unusual characteristics or complications; while, at the same time, the tendency to diseases of an *intermittent* character undoubtedly predominated; the influence of which was sensibly felt in the modification of other diseases.

The cause appeared to be connected with an unusual amount of rapidly decaying vegetation. A greater amount of rain than usual fell in the spring months, while the frequent showers of summer, alternated with sunshine and warmth, were promotive of a profuse growth of vegetation. In referring to a meteorological register, kept by John Lea, Esq., of Cincinnati, we find a note made in reference to the months of June, July, and August, characterizing them as "mild, moist, and fruitiferous." During no season for many years have we had such a luxuriant growth of vegetation as during the summer of 1855. Its growth was rapid, and it matured very imperfectly, so that its early decay was a very marked characteristic. Market vegetables decayed very rapidly, so that cabbage and other articles, including fruits of various kinds, which are ordinarily kept without difficulty until the following winter and spring, became very scarce long before the usual time of their disappearance. The fluids in them largely predominated; they afforded less nourishment to animals than in ordinary seasons; and they were more insipid to the taste. So noticeable was this,

that farmers found the products of the dairy less than in seasons of greater scarcity; the solid elements in the milk of cows being sensibly diminished in consequence of the increased succulency of the grasses upon which they fed. Could this diminution in the solid elements of vegetable food have exercised any influence on the nutrition of the human system in predisposing to this class of diseases?

The character of the season, in reference to moisture, warmth, and a profusion of immature vegetable growth, undoubtedly contributed to, if they were not the cause of, the peculiarities of the diseases of this year.

From the high price of the sulphate of quinia, and the difficulty of procuring it in some places in sufficient quantities when needed, the sulphate of cinchonia was extensively introduced into practice, and, in most instances, acquired a reputation in the treatment of intermittent fever scarcely inferior to that of the great antiperiodic itself. It sometimes appeared to answer even better than quinia, while, on the other hand, it would occasionally fail, and quinia complete the cure. The nitric acid treatment, alluded to in the report of 1854, was tried in many instances, but, in most cases, it did not meet the expectations of its friends, and was generally abandoned for the more certain antiperiodics.

The Committee is not aware that any other peculiarities in reference to the mode of treatment were developed. On one point, however, it may be remarked, that the preparations of bark scarcely ever failed to sustain the reputation so long held by this invaluable remedy in the treatment of intermittent fever, and as an antiperiodic in all diseases of an intermittent character.

In conclusion, I must claim the indulgence of the Association for this apology for a report. It must be taken as a supplement to those heretofore presented by the Chairman, rather than as one making any pretensions to completeness in itself.

In connection with this subject, it may not be amiss to suggest, whether something cannot be effected in the way of producing a uniformity in registration reports from all the States, by procuring some action of the Congress of the United States, previous, and in reference to taking the next census; and, for that purpose, would respectfully offer and recommend the passage of the following resolution.

Resolved, That a committee of five be appointed, the Chairman

of which shall reside in the District of Columbia, to memorialize Congress, and urge the passage of a law by which a uniform system of registration may be adopted by all the States for the purpose of obtaining correct reports on vital statistics by those whose duty it may be to take the census in 1860.

GEO. MENDENHALL.

REPORT

OF THE

COMMITTEE ON MEDICAL LITERATURE.

BY

A. B. PALMER, M.D.

REPORT ON MEDICAL LITERATURE.

THE Committee on Medical Literature, in respectfully presenting their Report, beg leave to premise, that, in attempting to discharge the full duty their appointment involves, they have met with some degree of embarrassment.

The standing rule under which the Committee acts, requires that there shall be presented "an annual report on the general character of the periodical medical publications of the United States, in reference to the more important articles therein presented to the profession, on original American medical publications, on medical compilations and compends by American writers, on American reprints of foreign medical works, and on all such measures as may be deemed advisable for encouraging and maintaining a national literature of our own."

For the year preceding the one just passed, no report was made on this subject, and the Committee which reported in 1856 was appointed two years previously, and, as they state, from not having access to full files of medical periodicals, no attempts were made to give an account of "the more important articles therein presented to the profession." It will thus be seen that such annual summary as seems to have been contemplated by this clause in the regulations, has not been presented for the last four years.

Your present Committee, doubting their obligations, if not their right, to go so far beyond the period for which they were appointed as would be required to supply this deficiency, decline to undertake the task of gathering around them, as would be necessary, some fourteen hundred numbers of medical journals, and so examining their multifarious contents as to point out with proper discrimination such articles as are "more important," and as might be judged worthy of special recognition by this body.

As to designate, for permanent record in the Transactions of the Association, the leading articles in the journals of one year out of

four, would give to the future but an imperfect, if not a distorted and unjust historical view of the subject, your Committee will content themselves with a discussion of the "general character of the periodical medical publications of the United States," referring to particulars only so far as may be necessary to illustrate general views.

Another source of embarrassment has existed in the Committee's not being in possession of all of the original medical works published during the two years which their report assumes to cover, and in the fact of some of these works coming under their notice at a period too late for a thorough examination, and, amidst the various other engagements of the chairman, for the formation of a deliberate and independent opinion of their merits.

But an embarrassment of another character is felt in the performance of that portion of the Committee's duty which requires a discussion of "all such measures as may be deemed advisable for encouraging and maintaining a national medical literature of our own," arising chiefly from the fact that the subject has already been so fully dwelt upon by former committees. It cannot be regarded as surprising that a degree of misgiving is felt, when entering upon a specific and limited field, so thoroughly traversed by such men as Holmes, Harrison, Stillé, Reyborn, Davis, Gross and Breckenridge, all sketching with their graphic pens nearly every aspect of its various landscapes. If your Committee, from their particular stand-point, shall reproduce some of the same features of these scenes—the necessity of the case—the importance of such features to the general picture must be their apology. Perhaps, however, the lapse of time since the earlier reports were made, render it not improper that some thoughts similar to those already expressed, should now be presented to the Association and the profession.

In examining the periodical literature of the country in reference to this report—in bringing under review its accumulated stores—in reading with care some of the many specimens of the well-digested and valuable articles found in the thirty medical journals at present published, and comparing this literature of the present with the past, your Committee have been impressed with its improving character, its abundance, its variety, and its general richness and excellence.

As no nation has so great a proportional number and so large a

circulation of newspapers and literary magazines as our own, so none has so large a number and so wide a circulation of medical periodicals. It has been suggested that there is a profusion—a positive excess—of these periodicals; that because of their great number and the consequent deficiency of patronage to each, their general quality is of a lower grade than though fewer existed.

That there are more journals in the country than receive a remunerative support is true; that very few receive an income enabling their proprietors to pay for contributions, and that perhaps none can offer pecuniary inducements for an editor of proper qualifications to devote the entire, or even more than a small proportion of his time to the performance of editorial labors, is also true; and it cannot be denied that these circumstances tend to depreciate the quality of the journals. But there are advantages in the large number and diffused localization of these journals, which more than compensate for such defects in their average quality as the greater number may induce.

Inexperienced and modest writers are much more likely to contribute to journals in their own neighborhoods which encourage home productions, than to those at a distance, whose abundant literary supplies may induce them to repel unpolished contributions. By means of the local journals many gems of truth are brought to the light which otherwise would have remained in their native mines—more facts from a greater variety of sources are poured into the common storehouse of knowledge—more materials for arriving at just conclusions are rendered accessible, and practical deductions and philosophical generalizations are thus rendered more valuable. Besides, a greater number of writers are thus brought out and cultivated, local emulation is excited, the more careful observation of facts and the more systematic recording of experiences are induced, and the masses of the profession are awakened and improved. Practitioners in the rural districts, away from the great centres of medical knowledge and the higher and more intimate professional associations, need, in their comparative isolation, the influence of these aids. It is not difficult to perceive that by these means not only the quantity of our literature will be increased, but its quality in the higher walks will ultimately be improved.

It is by no means a matter of slight importance to our literature, that country practitioners be induced to write. While appreciating the advantages which a residence in a large city,

amidst libraries, hospitals, and well-organized medical societies affords, it should be borne in mind that original thought is usually best cultivated in comparative solitude; and in the quiet of the country, though books are fewer, they are often more profoundly studied than amidst the distracting bustle of a town; and as matter of fact, it should not be forgotten that some of the ablest productions which grace our literature have emanated from men remote from cities. When, in addition, it is considered how much the numbers of physicians without the great centres exceed those within, the importance of their improvement will not be slightly rated.

In view of all the influences of local journals, your Committee are of the opinion that they should receive all the encouragement this Association is able to bestow, as thereby the interests of the whole profession will be advanced.

But there are defects belonging to our periodical literature which it should be our purpose to point out and correct. A considerable portion of the matter of medical journals very properly consists of descriptions of particular forms of disease, or of individual cases coming under the observation of the writers. The journals, indeed, have no more legitimate or important functions than those of spreading before the profession such descriptions from the various localities in our extended country, where so many varieties of diseases prevail. In order to give these descriptions their highest value, the phenomena and surrounding conditions must be related with much more minuteness, definiteness and comprehensiveness of detail, than is at present usual. Not only should the precise symptoms and course of the disease, and the influence which different modes and items of treatment have upon it be distinctly stated, but often the climate, season, and medical topography of the place—the occupation, customs, peculiarities, and all the important conditions of the patient should be specifically set forth; and as results are so often attributed to circumstances which bear no causal relation to them, the most careful comparisons should be instituted, and the greatest discrimination exercised; and as observation of many cases can alone correct erroneous conclusions drawn from accidental modifications of a few, the largest numbers possible should in all accounts be included. Meagreness, vagueness, or obscurity on any essential point, will seriously impair, if not completely destroy the value of these descriptions. Complaints of imperfections in the respects referred to, are of a standing charac-

ter, and have been very forcibly presented by former committees; and although improvement in this, as well as in other features of our literature is apparent, marking a corresponding advancement in the cultivation and intelligence of the profession, and in the development of the science itself, yet the grounds for these complaints are still so great, as to call for reiterated expressions, and for continued efforts towards their removal. Based, as such faults commonly are, upon an imperfect general and professional education, and accompanied by a vagueness of thought and a defective appreciation of the features which in each case should be observed and recorded, your Committee are fully aware of the little influence these statements will have upon the great body of those who need the admonition; and they are also aware that decided and permanent improvement in these as in other respects, must depend upon the operation of those slower causes, which, commencing with the primary school, shall follow the student in his course through the academy, the literary and professional colleges, and through his maturer hospital and other clinical studies, presenting him to the world a scientific, a cultivated, and in every sense an accomplished physician; and, after fully entering the profession, improvement must depend upon the operation of those other causes, which, inducing to, and accompanying associations with others, stimulating to continual study, to careful observation, and the frequent use of the pen, shall keep the aspiring physician to the advancing steps in the march of progress.

But a high degree of general perfection is not yet attained, and too much must not be required in articles, before admission into journals. While editors should exercise a proper power of rejection, they should not too readily discourage beginning efforts, as in so doing they may nip a bud which would otherwise soon expand into a flower, and ultimately produce the most wholesome fruit. Excrescences may sometimes be trimmed away, thorns may be removed, a proper direction given to distorted shoots, but the true bud of promise should be carefully preserved. The imperfections of youth and inexperience must ever be endured. The child should not be discouraged when taking his first tottering steps, or when lisping his first broken sentences; and if the first efforts of writers are repressed because of their imperfections—if no articles are received which have not attained to a high degree of excellence, our periodical literature will become meagre indeed. Under a too rigid system of rejections, few writers would ever attain to

any considerable degree of skill and perfection, as few in active life will practise composition for the mere purpose of improvement in the art. In our present condition nothing is perfect, and great reforms are not speedily effected. We should be indulgent and hopeful when improvement is progressive, though that improvement be slow.

Another class of articles, in medical journals, are occupied with the expression of opinions on various theoretical, scientific, and practical subjects. Affording expression of such opinions is also a proper function of these periodicals. Novel views are thus often suggested, and are presented to the profession for what they are worth—some, to be sure, furnishing only the most feeble and temporary glimmer, while others shine on with steady lustre, becoming fixed stars in the galaxy of truth. While too great license of crude speculation should be discouraged, a large degree of liberty in these expressions may with propriety be allowed. Still, it should be remembered, that facts are ever more valuable than opinions, and that a series of well devised and carefully executed experiments, are vastly more valuable than any succession of hypothetical speculations, however ingeniously conceived or happily expressed.

As an evidence of improvement in the profession and the science, the tendency in original writing now is, to the presentation of distinctly defined and well ascertained facts, and to specific inquiries into their causes and significance, rather than to the expression of vague opinions, or the indulgence in abstruse processes of *a priori* reasoning. While it is admitted that sound reasoning from facts tends to the clearer perception and firmer establishment of truth, attempts to reason without facts can only lead to confusion and error. The many systems of false doctrines, of the past and the present, have had their origin in attempted reasonings without a proper basis of demonstrated facts.

In many journals of late, both European and American, clinical lectures, first delivered to medical students, have been published. When clear, discriminative, and practical, as such lectures usually are, no more useful matter finds access to the pages of these periodicals. Physicians and surgeons in active practice need occasionally to have their minds refreshed on elementary principles, as well as to be briefly informed of the latest opinions and discoveries in pathology, of the best processes of diagnosis, and of the most scientific and successful methods of treatment. Clinical lectures, delivered by competent teachers to advanced medical students,

serve in an eminent degree all these purposes, and their publication in journals should be encouraged, as adding to the value of our periodical literature.

The style of the contributions to our medical journals, though in many instances very far from perfection, is however constantly improving, and in the main may be considered as highly respectable.

The chief characteristics of a good style for medical as for other scientific productions, are brevity and perspicuity. In this variety of composition, excess of ornament is peculiarly out of place, and is seldom met with in our medical periodicals. No fault of style is more offensive than that which attempts to communicate what should be said "plainly and decently" in inflated, affected language; and a profuse use of newly-coined, or foreign words, is decidedly objectionable. As new facts are constantly brought to light in the rapid advancement of the science—as objects or conditions not before observed, or processes not before witnessed become known, new names and new phrases are often required to represent and express them; still, those writers find the most pleased and willing readers who make the least use of novel and technical words, or of unusual phraseology. Plain, practical men (and the great body of physicians are such) are disgusted with a profusion of learned terms belonging to other languages; and it is alike an evidence of good sense, and real, not affected learning, to make use of language the simplest and most generally understood, which will convey the precise meaning intended.

Occasionally, though very seldom, articles are found in our journals in which all rules of rhetoric, and many of grammar, are disregarded; and more frequently the errors of the press, which cause the writer to utter absurdities the furthest from his intentions, remain uncorrected. Considering the extreme annoyance to writers which these blunders produce, as well as the danger of conveying false impressions to readers, they cannot be too scrupulously avoided; but those who have had much experience with types and printers will be inclined to treat leniently those conductors of journals whose editorial income will not justify the employment of professional proof-readers, who are necessarily much occupied with other pursuits, and who, notwithstanding all the care they can afford to bestow, are annoyed more than mere readers can be, by discovering too late these unseemly blemishes which had escaped them before, or by finding the errors they had marked in the proof, it

may be more than once, still staring them in the face. Of no good thing is constant vigilance more emphatically the price, than of presenting the pages of a professional journal, abounding in unfamiliar proper names, and technical, often foreign terms, free from errors. It seems due to the unfortunate editors of medical journals, insufficiently sustained, that thus much should be said to render their position in this respect appreciated.

The selections in our journals are for the most part judiciously made, and if many of them contain the same articles, it is only an evidence that different members of the editorial fraternity have similar appreciations of what is most valuable to their readers. As few physicians take more than one or two journals, this circumstance should not be a subject of complaint.

In some of our journals, translations of important articles from the French, German, and Italian are found, serving for the highest instruction in science; and many of these articles may be regarded as models in the art of composition. As comparatively few physicians have access to these foreign journals, or possess a knowledge of their languages, this species of literary labor should be encouraged.

In most of the journals a collection of brevities are made—an accumulation of scientific and practical items, constituting a department not the least interesting and valuable to the busy practitioner; and occasionally summaries of current medical intelligence from different parts of the world are found, serving usefully in keeping physicians interested in the affairs of their profession.

The spirit manifested in the editorial departments of our journals is, with few exceptions, liberal, honorable, courteous, and just; and the feelings of fraternity are generally cordial and warm. Differences of opinion must be expected occasionally to exist, and different interests will sometimes come in collision; and while this is the case, the imperfections of our common nature will be likely to produce some unpleasant results; but the bond of union, produced by an interest in a common cause, and that cause so noble as the advancement of a great and benevolent profession, should certainly, as it usually does, smooth down asperities, and preserve that courtesy and kindness which ever should exist between gentlemen and brethren.

From the contentions existing between the different portions of our common country, and which have so deeply affected the political, the religious, and the literary periodicals, the medical journals,

with scarcely an exception, have kept aloof; and it is devoutly to be hoped that the influence of this portion of the press, combined with the harmonizing power of this Association, may ever be exerted for the promotion of union both of hearts and states.

It has been justly said, that in a literary point of view the critical department of journalism holds the first rank, while it must be acknowledged that the labor of this department is often the most imperfectly performed. Occasionally an able review will be met with, giving a clear and faithful account of a work in hand, accompanied with judicious comments, showing an accurate knowledge of the subject, and an extensive acquaintance with books; but too often the place of critical reviews is taken by the most meagre "notices," couched in language at once stereotyped and vague, and sometimes betraying the profoundest ignorance, both of the work and the subject of which it treats. These notices, though sometimes flippant and censorious, tending to do injustice to authors by their misplaced severity, usually consist of the honeyed words of common-place eulogy, which, according as it is understood, may do injustice to either authors or readers. In some instances, in looking over the accounts of the same work in several journals, the most opposite statements will be found. In such cases, all cannot be right, and unfortunately the standing of the respective journals does not always indicate which is to be regarded. Still there is usually a similarity of language used, not only in different journals, respecting one book, but in most of the journals, respecting all books "placed by the politeness of the publisher on our table." The types which shadow forth such expressions as "No physician's library can be complete without it," "It should be in the hands of every student and practitioner," &c., might be supposed never to be distributed. In stating these facts, it is by no means intended to pass a general sentence of condemnation on editors of journals. In all this, there is no evidence of a disposition to do injustice either to authors and publishers on the one hand, or to the reading profession on the other. There are causes, aside from any corrupt motive, or even from indifference, which almost of necessity produce these results. To read carefully the works on different subjects, which make their appearance in such quick succession from the medical press—to compare them with similar works of the present and the past, so as to give an intelligent and valuable critical opinion respecting them, is no trifling task; and no man, even the ablest and most learned, with the pressure of a large practice, and

perhaps other studies and duties upon him, can command the time to perform this task, especially with that promptness which publishers require. Hence, the labor must be intrusted to other hands; or the title page and table of contents read, an examination, perhaps, made of a single chapter, and a vague commendatory notice given. An able and judicious friend, accustomed to write, and having the time or disposition to review thoroughly, without compensation, any newly published work, is not at the elbow of every editor of a medical journal. If the labor be undertaken by "a young friend at leisure," neither learned, able, judicious, or accustomed to write, the notice will probably be of that valueless character complained of. The plan of superficial examination is usually resorted to, and the accustomed praise is bestowed. If a notice must be speedily given, this is the only practicable course; for no one can think it right, even if it were not inexpedient, to condemn a work unread, either positively or with "faint praise." The evil referred to will not be fully corrected until each journal has such a list of paying subscribers as will justify the disbursement of money for literary labor.

It cannot be too strongly impressed upon those conducting medical journals, that as their duties as critics are the highest, so none of their efforts will so much influence the character of our literature as those expended in this department.

The duties of the critic have been justly said "to resemble those of the judicial station, and for their proper performance demand a high degree of those qualities which all men regard as indispensable to the expounders of the law."[1] He should be familiar with the subject of the work upon which he sits in judgment; should be acquainted with the past history and present condition of its literature; he should be capable of skilfully analyzing thoughts and arguments; should be able to distinguish between the substance of true logic and the shadow of sophistry; should be familiar with the different modes of expression, and have a thorough knowledge of the powers of language; and he should have the independence to dispense his opinions like the administrator of justice, with perfect impartiality—without fear or favor. As important truths may be clothed in the coarse garb of unpolished words, while frivolous thoughts or vain conceits may be decked in the tinsel drapery of a refined rhetoric, the critic should discriminate between

[1] Dr. A. Stillé, Report on Med. Literature, 1850.

the matter and the style of the works he examines. His gaze should be so keen as to penetrate all outer vestments, and enable him to study without obstruction the naked thoughts; and yet he must not be indifferent to language—that receiving his most unqualified praise which presents the least barrier between the author's ideas and the reader's mind.

Having regard to the fostering care proper to be bestowed on literary immaturity, the American medical critic especially should be ready to recognize merit in authors yet without reputation; and as beautifully said by a predecessor already quoted, he should "with generosity in praise, and delicacy in censure, encourage while he chastens the aspirant after literary fame." While thus aiding in the development of unassuming worth, he should have no compunctions in piercing the inflations of vanity by which the unworthy sometimes rise to the altitude of public favor. By the judicious exercise of his power he should foster the good and weed away the faulty in our literature, yet with such a gentle care that in rooting up the tares, he do not disturb the tender wheat.

The particular subjects embraced in the American medical journals, since a report of their contents has been presented to this body, cover almost the entire field of medical science and art. To point out all the articles which might be considered worthy of particular notice, would, as already intimated, require more time, labor, and space than can be afforded; while to designate only a few would be invidious. Of such importance are many of these articles regarded, that scarcely a recent work has been produced which has not made frequent references to facts or opinions contained in them. There is indeed a professional sentiment finding its expression in the journals, differing, on many subjects, from that contained in the books—the periodicals being, on most subjects, decidedly in advance of the standard works. Most discoveries are in the journals first brought to light, innovations are here first proclaimed, and through these channels of intelligence the knowledge of improvements becomes disseminated. The pages of the journals, rather than the books, reflect the present knowledge and opinions of the profession as a whole; and it cannot be doubted that these sentiments, thus reflected, mould to a large extent the character of the more pretentious productions. Facts and opinions are seldom now embodied in the books, which have not been foreshadowed in the journals. Frequently they undergo a kind of primary digestion in these first receptacles, before being submitted to the more perfect

elaboration fitting them for absorption. At any rate, wherever first received, they must go through both processes—in the journals and in the books, before constituting the flesh and bone of the medical body.

There is an awakened progressive spirit, and an ethical and moral tone in the journals, pervading both their editorials and contributions, which, in taking a survey of their general characters, should not be overlooked. Without an exception, so far as observed, they all advocate, and most of them with zeal and ability, a higher standard of academic and medical education for admission into the profession; and they urge upon their readers the advantages of local, State, and national associations as means of mutual improvement and the advancement of the science. They all sustain the code of ethics adopted by this Association; and the recent discussions on the subject of criminal abortions have exhibited a moral sentiment worthy of commendation.

In dismissing the subject of medical periodicals, and in view of their character and importance, your Committee are constrained to urge upon the Association and the profession here represented, the *duty* of extending to them a liberal and cordial support.

Gentlemen of ability, whose time must be regarded as valuable, are freely bestowing their energies upon journals which do not return to them the money advanced for their publication; and it is believed there is scarcely a medical journal in the country which is affording a fair pecuniary remuneration to those who sustain its literary interests. The unprecedented cheapness of our periodical literature may favor its circulation, but the inadequate compensation of writers of anonymous articles does not improve the quality of such productions.

If every physician in regular standing throughout the country took a single journal and promptly paid for it (and no one should take less than two or three), the present number of these periodicals, it is believed, would be well sustained, and their quality would be much improved. While, then, a material diminution in the number of journals would be a source of regret, as diminishing the number of contributions and repressing in different sections the development of a local literature, a more liberal support of those that exist is demanded of the profession.

It is but just to add that, in the mechanical execution and general appearance of our medical journals, there is a constant and gratifying improvement; and, considering the support they receive, and

the localities from which many of them are issued, the profession in this respect have no reason to complain.

A list of the medical journals at present existing in the country, and known to the Committee, will be found in the appendix to this report.

The next subject requiring to be noticed is, "Original American Medical Publications."

Since the last report on Medical Literature, presented to the Association two years ago, a considerable number of original works on medicine and collateral subjects have issued from the American press. These works, though possessing different degrees of merit, are, as a whole, of an order of which we need not be ashamed. If, when compared with the literature for the same period in Europe, they are not all that could be desired, considering the disadvantages under which we labor, they do not fall so far below the foreign standard as some European critics have intimated, and as might reasonably have been feared.

The remark has been repeated until it has become trite, that our country, and especially its literature, is yet in its infancy. In a young country, starting from however high a point of civilization, and containing however much talent and cultivation, there are ever demands in the active, practical pursuits of life, for the chief devotion of the greatest energies and highest talents it possesses. With our nation, the period for the seclusion from the active world of these highest energies and best intellects, and their exclusive devotion in any numbers, to science and literature, has not yet come. Labor is not so divided as that great talents and energies are directed to single subjects—especially to those not directly and immediately useful. We have few fortunes so large that their possessors think they need not be increased. We have few salaries for learned men without having such daily practical duties attached as absorb their energies and their time. Few have yet been trained to patient and prolonged investigations, or to fixed habits of profound, absorbing thought. Our excellence consists not so much in systematic seeing and thinking, as in energetic doing. While in our profession we succeed beyond others in practical results—in turning to purposes of the highest utility the knowledge of the world, we do not so much by patient investigation and elaborate reasoning contribute to that knowledge. Although it cannot be claimed that we furnish to the medical profession many of the pro-

founder productions on the more recondite and elementary subjects, yet we reflect back many practical results of the doctrines furnished, and not unfrequently startle the world with new discoveries, struck out by native shrewdness, and the force of a practical genius, rather than developed by the slower processes of systematic and patient labor.

As would be expected from this view of our condition and tendencies, the works in which we excel are of a practical character, and in this department, the history of our literature shows that we do excel; while from year to year there is a perceptible advancement made in the production of works on subjects requiring those patient investigations, in which we are yet behind some of the older nations of Europe.

In referring to particular publications, the limits of the present report will only allow of the briefest notices. The duty of one who reviews works of merit, has been said to be that of courteous recognition of the existence and claims of the works; of analysis, showing of what they consist; of accentuation, or of rendering emphatic the more striking features; and of criticism, or the offering of comments upon excellencies or defects which may exist. Little can be done in this report, other than to recognize in proper terms the works of merit which have come under the observation of the Committee, to a limited extent calling attention to features most striking, and occasionally making such brief comments as the cases clearly require. Nothing like analysis will be at all admissible.

The Committee wish in this connection distinctly to state, that while in the appendix they have presented as complete a list of publications making their appearance recently, and not noticed in the last Report on Medical Literature to the Association, as was in their power from the means at their command, they will in the body of the report attempt to notice only a portion of such publications, omitting all, with few specified exceptions, whether meritorious or not, which the reporter has not examined with sufficient care to justify the expression of an independent opinion.

One of the most important original works recently issued from the American press, is the highly scientific and practical *Treatise on Pharmacology and Therapeutics*, by Prof. Geo. B. Wood, of Philadelphia. We have in this truly national work many of the rich results of

a lifetime of observation and labor, prosecuted under circumstances unusually favorable for securing success. The high reputation of Prof. Wood, won by his long career of teaching and by his former works, has been even more than sustained in this, which he states will be the last, and which the Committee regard as the best of his productions. In speaking of this work in terms of such decided commendation, it is by no means intended to be stated that none of the author's views are capable of being controverted. This is perhaps true of no extended medical work. But the practical views advanced are those of an enlightened, judicious, observing, reasoning, and conscientious man, who speaks not from the authority of others, but from the convictions of his own mind; and all that he says is worthy of attention. This work, taken in connection with the *United States Dispensatory*, constitutes a system of Materia Medica and Therapeutics, which, for completeness and value, need not shun a comparison with any other work. This is saying very much, as will be appreciated when the encyclopedic work of Pereira is brought to mind; but a careful comparison of the works for purposes of daily use, and in relation to everything that is practical and essential, should make any American feel that in such a test his country is sustained. In this department of medical literature, Young America, though in swaddling clothes, has shown the strength of maturity. This remark is made not without reference to the excellent works of Dunglison, Beck, and Mitchell, new editions of which have been recently published, and to the very elaborate work of the venerable Dr. Tully, which is in the slow process of publication in numbers, issued at somewhat distant and uncertain periods.

This work of Dr. Tully requires an additional word. It is evident, from the numbers which have appeared, constituting two good sized volumes, that a vast amount of labor, extending through a long period of time, has been bestowed upon it, and in some respects it possesses very great merits. It is, however, behind the facts and philosophy of the times in some few particulars. As an example, it discredits the present views respecting the absorption of medicines and their action within the blood and upon distant organs by being carried to them in this fluid; and the work is loaded with a profusion of new terms elaborated from the Greek, which render it distasteful to many not familiar with that language. As an example of one of its many excellencies, it may be mentioned, that the descriptions of the phenomena produced by the action of the several classes of medicines—its philosophical defini-

tions are the fullest and most systematic of any others to be found. It is a matter of regret that the publication does not proceed more rapidly, as the work, when completed, will doubtless be one of very great value for reference and study.

In connection with the subject of Materia Medica and Therapeutics, the recent work of EDWARD PARRISH, of Philadelphia, on *Practical Pharmacy*, is worthy of mention, as a needed and excellent production on an important *department of the art of medicine;* and, in the same connection, the work on *Chemical and Pharmaceutical Manipulation* of Prof. Campbell Morfit, of the University of Maryland, and Clarence Morfit, Assistant in the United States Assay Office, a second edition of which has been recently published, should be named.

Your Committee can but express their gratification at the attention which the subject of pharmacy is at present receiving. They have noticed with pleasure the formation of an active and successful American Pharmaceutical Association, and are delighted with the spirit and ability with which its proceedings have been conducted, and also by the manner in which the interests of pharmaceutical literature, periodical and permanent, are sustained and advanced. A body of intelligent and laborious men are making rapid progress in this department of medical science and art, and it seems due that they should receive all possible encouragement from the profession represented by this body. The Committee feel assured that there is every disposition on the part of intelligent physicians to extend the hand of fellowship, to utter the words of approval, and to render the assistance of patronage to all well educated and advancing pharmaceutists.

Prof. S. H. DICKSON, of Charleston, S. C., well known to the profession as an able teacher and practitioner, and a peculiarly elegant and agreeable writer, has produced a revised and condensed work on the *Elements of Medicine*, or a *Compendious View of Pathology and Therapeutics*, in which he furnishes the profession with the results of his extended reading, his careful observation, and his large and long experience, particularly in the diseases of the South. The present, as well as his numerous former productions, indicates an active intellect applied with industrious care to his subject. While fulfilling a mission of usefulness with students and practi-

tioners, this work will reflect credit upon the literary taste and ability of our country.

Prof. AUSTIN FLINT, of Buffalo, N. Y., has produced a volume of 636 pages, on the *Physical Exploration and Diagnosis of Diseases affecting the Respiratory Organs*, which may, with the utmost assurance, be pronounced a work of ability, and as belonging to that class of works which, from their fulness and thoroughness, will do much to redeem our literature from the charge of superficiality. Prof. Flint has studied his subject thoroughly, as he has every other upon which he has attempted to enlighten the profession, and with the ability which he possesses, he needs only to labor on with the same industry and care as heretofore, to establish himself in the first rank of American authors.

The elaborate work of Dr. RENÉ LA ROCHE, of Philadelphia, on *Yellow Fever*, is an exceedingly able and exhaustive production—indeed, almost unexampled in its completeness, upon an obscure and interesting subject; a work which must reflect permanent credit upon our literature. All the works of Dr. La Roche, though not in every instance written in the most condensed style, have indicated indefatigable industry, extensive research, sound discrimination, and a pure and refined taste. Should monographs of this character multiply and become sufficiently abundant among us, we should have a national literature that would compare with any other. Too much encouragement cannot be given to full and elaborate works on single subjects of interest. By the production and study of such works must our knowledge be increased, and the character of our national literature advanced.

The medical officers of the United States Army for years past have been required to keep careful meteorological records at the various posts at which they are stationed throughout our wide territory, as well as accounts of the sickness and mortality of the troops under their charge. Within a short time past, these accounts have been brought together, and, at the expense of the government, have been published and presented to the profession and the country. The first is a folio volume of 763 pages, consisting of a *Meteorological Register for twelve years from* 1843 *to* 1854, *inclusive, prepared under the direction of Gen. Thomas Lawson, Sur-*

geon-General of the U. S. A. The second is a volume of about the same size, consisting of a *Statistical Report on the Sickness and Mortality in the army of the U. S., compiled from the Records of the Surgeon-General's Office, embracing a period of Sixteen Years from Jan.,* 1839, *to Jan.,* 1855, *prepared under the direction of Surgeon-General Lawson,* by RICHARD H. COOLIDGE, M. D., Assistant Surgeon U. S. Army.

Your Committee are deeply impressed with the importance to medical science, and to the progress of the most valuable kind of medical literature, of elaborate statistics of this character; and if practitioners generally would simply do what the surgeons of the army have done—would keep a record occupying them a few minutes each day, with some additional minutes, or possibly a few hours, at the end of each month, in order to place the daily notations in a proper form, an amount of facts would, in a few years, be accumulated, which, in their results, would establish many questions now unsettled. The facts contained in these volumes are beyond all price, but, as they relate only to a particular class of persons, to soldiers, and they frequently passing from one region to another, the results occurring in one locality being often produced by causes existing in another, apparent conclusions are not always reliable, and these conclusions can only be corrected by the statistics of a fixed population, consisting not merely of men under a particular discipline, but of men, women, and children of all ages, habits, and conditions. Though statistics applied to a particular class of persons are, for some purposes, most valuable, for others they are comparatively worthless, and results entirely satisfactory can only be obtained by extending them to large numbers in various conditions. The greatest credit is due to Surgeon-General Lawson, and the profession and the country are under many obligations to Assistant Surgeon Coolidge for his zeal and industry in arranging these statistical reports. To the Surgeons and Assistant Surgeons who have contributed the many able articles, our thanks are also due, and especially when we consider the circumstances under which many of them must have observed and written. It is ardently to be desired that the example set by the medical officers of the army may be followed in civil, in hospital, and in private practice. Glorious results to science would certainly follow.

As in a degree connected with these subjects, a work has been

recently produced in Philadelphia on the *Climatology of the United States*, by LORIN BLODGET, which is worthy of mention.

FRANCIS WHARTON, Esq., and the late Dr. MORETON STILLÉ, have added to a department of our literature, which for a long time was exclusively, but very ably represented by the great work of the lamented Beck, a *Treatise on Medical Jurisprudence.* The work is one of merit, combining in its production the talents of a legal and a medical gentleman, both men of ability and learning in their professions, and it will occupy a permanent place in our literature.

Within a few months past, a volume has made its appearance in New York, containing elaborate opinions of several members of the profession in relation to a case in the courts, involving questions of no ordinary interest, bearing upon the jurisprudence of insanity. The case is known as the "Parrish Will Case." Opinions based upon the legal testimony are given by Drs. John Watson, Brown, Ranney, Pliny Earle, Bell, and Ray, of our own country, and Sir Henry Holland, of England.

From the great wealth and high social position of the parties interested, and the amount of property involved in the decision as to the validity of certain codicils to the will, the opinions of these able experts were solicited, and were given with such fulness and care that the volume containing them possesses literary merits which justify this recognition. Dr. Watson's paper constitutes nearly one-half of the volume, and, like everything else which comes from his pen, is elaborate and able. It enters very minutely, even, perhaps, with unnecessary fulness, into the testimony, and discusses at length every aspect and bearing of the case, bringing a great number of authorities more or less directly to bear on the various professional questions involved. It is in every way characteristic of Dr. Watson. While indicating a high degree of learning, it evinces the most indefatigable perseverance in investigating every point in a controverted question.

Dr. Earle's opinion is clear, judicious, and eminently discriminative, and clothed in language at once polished, transparent, and forcible. His familiar acquaintance with the subject, his logical mind, and his elegant style, render his paper a model.

The opinions of Drs. Brown and Ranney are somewhat less elaborate, but are sensible, to the point, and in every way creditable. Those of Drs. Bell and Ray evince intimate acquaintance

with the subject, highly logical and discriminative minds, and each is expressed in a direct, clear, and forcible style, possessing the ring of the true coin.

The opinion of Sir H. Holland is much more brief than that of any of the rest, and confined strictly to the medical aspects of the case. It aims directly at the strong points, and presents them in a clear light; but being confined in its effort to a more limited range, it has not that breadth of view, and attempts nothing of that elaboration of the subject, which mark most of the other papers. The whole volume evinces an amount of ability which reflects great credit upon the authors, and our national pride is gratified in the fact that when the productions of our countrymen are placed side by side with that of one of the very first intellects of Great Britain, on the same subject, the former do not suffer by the comparison. Although, in his paper, Sir Henry Holland does not enter upon a full discussion of all the questions involved, confining himself rather to an expression of his conclusions as the result of his examination, yet we have in this instance a degree of confirmation of the opinion, generally regarded as true, that when the American intellect is brought to bear upon a subject requiring, in its mastery, acuteness, discernment, and practical wisdom, it is not surpassed by the intellect of any other nation.

An anniversary discourse upon the *Medical Profession in Ancient Times*, by Dr. JOHN WATSON, has been published in a volume of 222 pages, so thorough in its research, and so correct and forcible in its style, as to deserve a notice among the more valuable articles in our literature.

Dr. GUNNING S. BEDFORD, of New York, has published a volume of *Clinical Lectures on the Diseases of Women and Children*, which has rapidly passed through several editions, evincing the appreciation of the profession for works of that kind, combining, as clinical lectures should, the statement of elementary principles with practical details. Dr. Bedford's work, while not specially elaborate or profound, nor presented in a style always concise or in proper taste, is nevertheless readable, practical, and useful.

Dr. HENRY MILLER, of Louisville, Kentucky, has very recently presented the profession with a new edition of his *Principles and Practice of Obstetrics*, etc., so much revised and improved, that it

may be regarded as a new work. It may be characterized as a sensible, practical, useful book—worthy of a permanent place in our native literature. It is doubtless susceptible of further improvements, which, it may be anticipated, a demand for new editions will furnish an opportunity of making.

A new work of 618 pages, illustrated by 434 wood-cuts, has made its appearance on *Human Histology*, by E. R. PEASLEE, M. D., etc., presenting the present state of knowledge on the subject of which it treats, in a full and fair manner. This elementary production may be regarded as a useful addition to our literature, and as being entitled to supply the place with the American student and physician, hitherto occupied by the translations and reprints of foreign works. As this work seems well adapted to the purposes of a text-book, it may with great propriety be recommended as such by teachers. While it is believed that students are entitled to have placed in their hands the books best supplying their needs, from whatever source derived, yet national pride, as well as justice to our own authors require, that, when of equal merit, the American works should receive the preference. This course is alike just to students and native authors, and is demanded by the interests of our literature. This remark is intended to apply generally, and there are especial reasons for preferring works on practical subjects by American authors, as they are more likely to be adapted to the peculiarities of diseases and practices among us.

Prof. S. D. GROSS, of Philadelphia, during the past year, has published a new edition (the third), of his *Pathological Anatomy*, so fully revised as to give it almost the character of a new work. Notwithstanding the deservedly high reputation of the former editions, this department of the science has so much advanced since their issue, that such a revision was doubtless required. Though the Committee have had access to the work, it has not been in their power to give it more than a hasty examination; and they are obliged to confess that such a thorough investigation of the subject has not been made, such careful comparisons have not been instituted, as will enable them to express an independent opinion of its full merits, in its present revised form.

No man, in this country, of large abilities, can afford to be a mere pathological anatomist, and it may be doubted whether one should be exclusively such anywhere, as men entirely devoted to a particu-

lar subject, like Rokitansky, are quite as likely to fall into errors as those who indulge in a more extended range of observation and thought; yet a large, though not an exclusive devotion to the subject, is necessary to the production of the most elaborate works. A work of the greatest elaboration could, therefore, hardly be expected from Prof. Gross, being engaged as he is in so many other absorbing labors; and yet his capacities are so large, his industry is so untiring, and his facilities of possessing himself of the views of others, as well as of making observations for himself, have been so great, that we cannot doubt that the work is able, judicious, and, in the main, reliable—presenting a fair view of the present state of knowledge on the subject. The position and reputation of our distinguished countryman are such, that his work could not be passed over without recognition, and the examination of the Committee has been so imperfect, that a more definite opinion could not be given.

Dr. GROSS's elaborate monograph on *Foreign Bodies in the Air-Passages* has been for a considerable time before the profession, and has established its claims to be considered as by far the fullest and most complete work on the subject ever published. It belongs to that class embracing such productions as those of Flint, La Roche, Bartlett, and the other monographs of Dr. Gross himself—works which cannot be too much encouraged, as they contribute so largely to the value of our literature.

The *Treatise on Surgery*, by Prof. H. H. SMITH, of Philadelphia, from the position and ability of the author, should receive a recognition from a committee of this body on Medical Literature; but the confession of a superficial examination, and a consequent want of independent opinion must in this case also be made.

Prof. PAUL F. EVE, of Nashville, has compiled a volume of *Remarkable Cases in Surgery*, in which he has brought together descriptions of a large number of curious and instructive surgical phenomena—the work reflecting much credit upon the research and industry of the author, and furnishing useful recreation to the readers. Few striking cases will be met with in practice, which will not be found similar to some in this volume.

Prof. JOHN W. DRAPER'S recent work on *Human Physiology*, is the product of a clear and discriminating mind, and is presented in the direct and lucid style characteristic of its distinguished

author. It maintains the doctrine of the unity of the race, and the sufficiency of natural causes to produce the varieties observed; and the tone of the work is reverential, doing no violence to the enlightened religious sentiments of the country. The work seems as much intended for the general, as for the professional reader, and has received much more attention from the non-medical press and the general community than any other ever published in this country, on the same subject.

A second great ethnological work, *The Indigenous Races of the Earth*, has made its appearance under the direction of Dr. NOTT, and the late Mr. GLIDDON, the authors of a former work on the same general subject, entitled *Types of Mankind.* Elaborate articles on different departments of the subject are furnished by different learned gentlemen, and a high scientific character is attempted to be given to each part of the work. It is indeed a work of great labor—the result of great efforts on a great subject—but upon a subject of much obscurity, and one which has not been under accurate scientific investigation for a sufficient length of time to reduce its immense masses of diversified facts to systematic order, clearly showing them to possess the same general tendency and significance.

The leading idea with the originators of the work seems to be, to establish the diversity of origin of the human race; to prove that there are in fact many races, as distinct from each other in origin as the different species of the lower animals. The desire to establish this doctrine is manifest in the contributions of Dr. Nott, and especially so in those of Mr. Gliddon; and it is difficult to avoid the impression that a design to establish particular views was predetermined, and that this desire and intention gave rise to the investigations of the subject, and the production of the works.

Most enlightened and Christian men, perceiving an essential similarity in human organisms, the readiness with which different varieties mingle together, the marked changes in appearance and character produced by differences of climate and modes of life, operating upon a few generations, and even upon individuals; and receiving in a somewhat literal sense the declaration, that "God has made of one blood all the nations of the earth," believe that the human race has a single origin—that it consists of a single species. The modifying influences of systems of breeding and training of domestic animals—the striking transforming effects of such

influences, operating even for a few generations, being within the knowledge of all, the strong force of analogy is given to the view, that diverse natural causes operating upon different portions of the same original race for an unknown series of generations, are quite sufficient to produce all the differences observed; and all the more patent facts taken together, furnish at least *prima facie* evidence of its truth. The burthen of proof certainly is with those who deny the common sentiment, and whatever may be regarded by some as to the probabilities, no one can claim that their doctrines are established.

In examining the facts in Philology, Iconography, Cranioscopy, Palæontology, Archæology, Comparative Geography, and Natural History, all of which subjects as bearing upon the main question are discussed in the volume under notice, it seems evident to an unprejudiced mind, at least to the mind of your reporter, that these facts will bear various interpretations—that their significance will be variously understood and construed according to the prepossessions and to the particular course of study and thought of the examiner. The reasons given for many of the conclusions contained in the articles in this volume, seem entirely unsatisfactory, and indeed the writer of the article on Cranioscopy, Dr. J. Aitken Meigs, frankly and explicitly confesses that the period for drawing conclusions has by no means arrived.

This work, and its predecessor, the *Types of Mankind*, though containing many things objectionable, and some, in view of the general sentiments and acknowledged interests of the people, even reprehensible, still, in a literary point of view, are an honor to the gentlemen that have produced them, and will furnish a proper point of departure for future investigations. Your Committee feel under obligation to express disapprobation of the course of any writer upon scientific subjects, who travels out of the necessary line of his argument for the purpose of throwing ridicule upon any book regarded as sacred by a large portion of the people among whom he resides, and for whom he writes.

One of the greatest, or, perhaps, as it should be designated, *the* greatest scientific work of the times, like the foregoing, not strictly medical, but like all scientific productions relating to organized beings, having intimate connections with our profession, is now in process of preparation, the first two volumes having recently been published. It will be understood that *Contributions to the Natural*

History of North America, by LOUIS AGASSIZ, is referred to. This great work by one of the greatest of masters, requiring such capacities and powers, such knowledge and labor in its prosecution, and which promises to be so transcendent in its complete execution, demands from all men, and especially from all scientific bodies of Americans, a respectful and reverential recognition.

It is an honor to our country that the first of living naturalists and scientific men, leaving the proud circles of Europe where his society was ever sought, should adopt this as his home, and make it the theatre of his labors; and that, relying upon the favor of neither monarchs nor courts, but trusting to the love of science of an intelligent people, and depending upon their liberality for the means of prosecuting his greatest, noblest work—it is indeed an honor and a glory of which all Americans should be proud, that so far from resting upon a broken reed, as too often proves the promises of kings, he has met with a response from the people he has trusted, as free and generous in its bestowal, as it is ample for his work's needs.

Of the characteristics of Prof. Agassiz, and his adaptation to the work he has undertaken, it is unnecessary to speak. The world well knows that he possesses not merely the talent of scientific observation and research, but its genius; combining with the intensest love and readiest appreciation of facts, the keenest perceptions of the relations of those facts—the highest capacities for the broadest generalizations. Those who are familiar with his works, and especially those who have known the man, need no one to say that he is inspired by an ennobling love of truth, which elevates him immeasurably above everything vain and selfish, and gives to his statements of facts an authority and weight, which neither denial nor approval can diminish or increase.

The introductory *Essay on Classification* is the most annihilating blow ever levelled at the unscientific theory of creational development—a theory which attracted so much attention a few years ago, and which still infests the minds of some, excluding the idea of an active Creator from the universe of life. It is truly cheering to men of thought and science, like many in our profession, whose contact with humanity, its sufferings and its hopes, has preserved from destruction those impulses of faith and devotion belonging to their nature, and clinging to the heart even when, by the habitual consideration of secondary causes, they are almost driven from the head—it is indeed cheering to such, to find the highest

authority in science deriving from the most intimate acquaintance with nature and her laws, the inevitable deduction of a divine, intelligent, and eternal Cause.

There have been published within the last two years various prize essays, proceedings of medical societies, and a large number of other minor productions—discourses, pamphlets, &c., many of them possessing much interest and intrinsic importance, but a special notice of more than a very few of which the length of this report forbids.

An Anniversary Discourse before the New York Academy of Medicine, by Dr. J. MARION SIMS, Surgeon to the Woman's Hospital, and published at the request of the Academy, on the subject of *Silver Sutures in Surgery*, from its relations to the subject of the improved methods of treating vesico-vaginal fistules, will justify its being regarded as an exception to the mass of these smaller productions.

The Committee have been interested in the account of the process by which Dr. Sims, through years of effort—of hope and disappointment, was finally led to the use of silver sutures, and to his full mode, altogether unparalleled in its success, for the cure of the sad and loathsome accidents referred to.

Dr. N. Bozeman, of Alabama, formerly associated with Dr. Sims, has published two pamphlets, setting forth what he regards as an improvement on Dr. S.'s method, in the use of what he calls a "Button," instead of Dr. Sims' "Clamps." Whether the "button suture" may be an improvement in some cases or not (Dr. Sims thinks it is not), it is quite certain that to Dr. Sims is due the honor of a discoverer and an inventor; and nothing, not even the just imputations of bad taste in presenting the subject, can deprive him of either the consciousness or the reputation of conferring very great credit upon American Surgery, and being a benefactor to the unfortunate and suffering. The great "Woman's Hospital," when erected in New York, will be at once his most befitting monument, while it will serve as a lasting evidence of the humanity and liberality of the profession and the citizens, and, prominent among them, of the ladies of that metropolis.

A pamphlet of eighty-two pages has been produced by Dr. N. D. STEBBINS, of Detroit, Michigan, on *Evidences of a General System of Medical Practice being taught in the Bible, and a Comparison of this*

System with Rational Medicine and Homœopathy, which in consequence of the entire novelty of the subject, and originality of the work, requires to be noticed. Dr. Stebbins is a thorough student of the Bible, and has given much attention to its incidental teachings on the subject of medicine, and has presented in his production a view at once novel, curious, and interesting; and one well worthy the attention of those who regard the Bible as an inspired book, and yet are inclined to favor the absurdities of the mystical system of Homœopathy. The intimate sympathies between heterodoxy in religion and in medicine are beginning to attract attention, and should be carefully observed by all who desire the stability of those views on either subject, which are regarded by the greatest number as important to the highest interests of the race. Dr. Stebbins' work will aid materially in tracing out such relations.

The same author, in a discourse lately delivered as President of the State Medical Society of Michigan, has shown in a very satisfactory manner that medicine is an Inductive Science, and that Hippocrates, rather than Bacon, is entitled to be regarded as the father of Inductive Philosophy.

Of the numerous, and many excellent foreign works which have recently been reprinted in this country, no further special notice will be attempted in the report, other than the insertion of their titles in the appendix. The same may be said of new editions of native works. The list will show a large issue both of reprints and new editions, indicating a large demand for medical works, and an extensive gratification of a taste for medical reading throughout the profession. The opinion of the Committee respecting the influence of reprints of foreign works will be found in what shall follow.

The last division of your Committee's duty, is to report on "Such measures as may be deemed advisable for encouraging and maintaining a national literature of our own."

This elevated and interesting theme has been more or less extensively elaborated by seven very able committees of this body—by men who have evidently felt a deep, some of them a special personal interest in the subject as authors; and much time and mental effort have been spent to present in the strongest possible light the views they have regarded as important to be urged. Though upon most of the points there has been a general agree-

ment of views, yet upon the subject which has given occasion to most discussion (the necessity of an international copyright law), there has not been unanimity among former reporters; one committee having ably expressed dissenting opinions. The whole subject has therefore received a thorough consideration, rendering it unnecessary on the present occasion to give a full exposition of all the means for encouraging and maintaining our literature. As, however, the rule under which the Committee acts seems imperative, and the subject is one in which the Association and the profession have manifested a decided interest, it may not be passed over in silence.

Some intimations have already been made of the general character of our medical literature, and a portion of the causes which determine that character have been hinted at. While we have many native works of the greatest respectability, and, in a practical point of view, of the very highest utility—some indeed of the profoundest general merit—yet truth and candor compel us to admit, that the degree of scholarship, both general and professional, manifested in the mass of our works, admits of much improvement. This, perhaps, may be truly said of the mass of medical works of any nation. But whatever may be said of others, in most of our medical productions there are not those evidences of expansion of views, combined with concentration of thought and effort, of patient industry and extensive research, manifesting themselves in the highest artistic arrangements and the fullest elaborations; and there is not that elevation and finish of style which will render them permanent classics. We have indeed very few works that will stand the test of time—that, notwithstanding the changes of opinion arising from the advancement of knowledge, or the change of conventional taste produced by varied associations and customs, will remain enduring monuments of our skill, giving permanent historic greatness to our country and age. It is true that few works in any nation or time have attained this standard, yet short of the production of many such works we should not cease our efforts at improvement. But the very pertinent question arises, What is to be done to effect the desired improvement? To what particular point shall this Association direct its efforts? What, if any, definite and specific measures shall it recommend?

All plans of Central Committees, to set in judgment upon manuscript works, and present for publication those thought to be worthy, have been abandoned as impracticable, and all similar forced mea-

sures will ever be so found. Fruit cannot be brought from the earth by any magic wand; nor can a plant be forced to speedy, yet vigorous and enduring development by any hot-house process. The good seed must be planted in soil properly prepared. The gentle hand of the skilful gardener may do much in keeping down noxious weeds, and preserving all the necessary conditions of healthy vegetation; but the rain and sunshine of heaven must be invoked, and time must be given for the plant to grow and ripen. Seed-time and harvest are promised to the faithful husbandman, but they occur at distinct periods. He learns to labor and to wait—and so should we. But as we must labor while we wait, the question again recurs, What direction shall this labor take?

When speaking of the defects in our medical journals, it was stated that one fundamental cause preventing the development of our literature, was the imperfect education, academic, and professional, of the great body of American physicians.

If this be so, an important means of improving our literature must consist in making provision for rendering preliminary and medical education more thorough and perfect, and in insisting upon higher attainments in those seeking admission into the profession. On this point it is unnecessary to dwell. It is well known, that except in unusual instances, early deficiencies are not overcome. A want of mental discipline and an ignorance of language—habits of loose thought and illogical reasoning, and of the use of vague and inelegant language, established in the plastic condition of the mind, will usually adhere to the person more or less through life; will obstruct, often irremediably, successful study, and will almost certainly act as positive disqualifications for high authorship.

Even if the few who assume to be authors are well educated, it is impossible for them to escape the influence of associations. The materials from which books are constructed, being largely derived from the recorded observations and experiences of cotemporaries, if the masses be imperfectly educated, are corrupted in their sources. These observations, upon which reliance must be placed, are neither systematically made, nor accurately recorded; and besides, the intelligence and taste of expected readers ever exert an influence upon the efforts of writers. So much influence have associations, that very seldom do the few in any profession rise far above the average of the many. The medical profession, bound together by numerous ties, is so far a unit, that the most effectual method of

elevating the few is to bestow our efforts upon the improvement of the many.

In the excellent systems of schools, primary, union, normal and collegiate, which are being developed in different portions of the Union, is our greatest hope. Here scholarly tastes and habits will be formed, which, if properly fostered while the student is pursuing medical studies, will do more to elevate the profession and its literature than any specific measures which all the wisdom of this Association can devise, or any governmental authority can execute.

One particular measure, however, your Committee are constrained to recommend in this connection, which has not received the consideration of former committees; and that is, that students while in the offices of their preceptors, and in the medical colleges, be required to perform exercises in composition—writing short theses frequently on medical subjects. From the experience on this subject which the author of this report has had, the most favorable opinion of the beneficial effects of these exercises is entertained. Such productions read at stated periods in the presence of other students, and commented upon by the teacher, cultivate in a rapid manner the art of writing on medicine and science, and form habits of composition which will not be readily laid aside. If the practice generally prevailed in medical colleges, as it now exists in at least one, it would not only directly cultivate the art of writing, but would do very much in elevating the standard of preliminary education; as few would have the hardihood to submit themselves to such an ordeal, without a consciousness of being prepared to acquit themselves respectably. In the institution referred to, nothing has done so much to keep imperfectly educated and illy prepared men from becoming candidates for graduation. In view of this requirement, many have returned to their preliminary studies, while others have sought those schools for graduation where such an ordeal could be avoided. It is unnecessary to say, that in addition to these advantages, the practice of writing upon the subject of their studies, produces clearer perceptions and greater precision of thought, besides inducing more thorough investigations. It can but be seen, that the influence on our medical literature, of such requirements, must be decided and salutary, and it is hoped the subject will receive such attention as its importance demands.

The fact that nearly all our countrymen, from their peculiar condition and circumstances, are engaged in seeking for the immediately practical, and are not inclined to devote themselves in

seclusion from the busy world to the patient labors of scholastic pursuits, has already been referred to in accounting for the imperfect condition of our literature. This condition and tendency incident to a new country, will in time pass away.

Were it within the power of this Association, or any other combination, to change the present national impulse to haste and superficiality in the acquirement of learning; to create a large class of devoted and profound scholars; to render the attractions of science and literature more powerful to men of talent and enterprise than the glitter of wealth, the excitement of politics, or the pomp of station; or were it possible to move forward the index which points out the centuries on the great dial of time, thus speedily bringing this young and expanding country to its mature age and full proportions—bringing it to the period when this continent shall be subdued, its forests felled, its prairies cultivated, its mines opened, its rivers bridged, its mountains tunnelled; when its great cities shall be built, its canals and railroads completed; when in short its agriculture, its manufactures, its commerce, and all its material interests shall be developed; when its great fortunes shall be accumulated and be seeking objects for bequests—and when further, its political, social, educational and religious institutions shall all be corrected and established; when all high stations connected with government shall be filled by men so fitted to the places that they cannot be easily removed, and yet a large amount of cultivation, energy and ambition shall not be provided for:—could we indeed be transferred to the time, somewhat distant, but approaching, when great hospitals shall be built in populous cities scattered along the two great seaboards, and distributed throughout the vast interior valley, extending from the polar circle of the north to the tropics of the south; when these hospitals shall have schools of medicine attached, under the charge of a large corps of salaried teachers, placed there as a reward of professional merit:—could all this be speedily done, as it will ultimately be done, then would be developed an American Medical Literature, which would as far surpass the present medical literature of Europe, as American energy, enterprise, and institutions, will then surpass the present energy, enterprise, and institutions of the Old World.

But this index upon the dial of ages will be moved only by its proper machinery, and the great pendulum will swing only in its own measured way. This full development, this millennium of American medical literature must abide its allotted time. But be-

fore that time shall arrive "Many shall run to and fro and knowledge shall be increased." Gradual preparation must be made, the march of improvement must be constant, onward. Each member of the profession must add his facts to the accumulation of knowledge. Each stream must yield its tribute to the ocean of truth.

In the report on "Plans of Organization for State and County Medical Societies," presented to this body on a previous occasion (1856), the plan was introduced and urged, of requiring all members of local societies to keep a record of the cases occurring in their practice—of noting down the prevalence of particular diseases, and the circumstances under which they occurred, &c., and of reporting such records to local organizations, to be arranged with others in a condensed form, accompanied by proper remarks and explanations; these records of local societies to be reported to State organizations, and here again being re-arranged and tabulated, to be sent to this body for final arrangement and permanent record. Some of the great advantages of such a plan to medical science were in that report referred to, and its influence upon medical literature—this literature being but a reflection and representation of medical science—must be apparent. The plan, so far as it has attracted attention, seems to have met with the approval of the profession, and at the last meeting of this Association, resolutions were adopted indorsing its provisions; but your Committee are of the opinion that, although some local societies are at present acting upon it with the greatest advantage to their members, inducing in them closer observation, and more careful study and comparison of cases, and infusing new life into their associated proceedings, yet the full importance of the measure—the greatness of the results of its general adoption and efficient execution—has not sufficiently penetrated the minds of the profession.

Referring to the report in question for further details, your Committee would urge upon the Association the propriety of taking measures for carrying into effect some practicable arrangement, in accordance with the spirit of the resolutions already adopted.

The Medical Society of the State of New York has already taken important action on the subject, and the President of that body, Dr T. C. Brinsmade, of Troy, a pioneer in this matter, has long kept such primary records as are contemplated. Should the Society of the Empire State urge this reform with such zeal and power as to secure the general action of the profession, it will add to its diadem of renown a star more bright and enduring than that inserted by

the origination of this Association—for if the plan be carried into operation, and there be obtained "careful, minute, and extended reports of the local prevalence of diseases, the peculiar characters which they may present, and the peculiar circumstances attending them, as regards their cause, their nature, and their treatment—such reports not limited to public institutions or large towns, which would be but imperfect, often erroneous guides to those in the walks of private practice and in rural districts, nor restricted to one season in which the 'epidemic constitution' may differ from the next, but obtained from a great variety of sources, extending over a lengthened period of time, and in a properly arranged and condensed form placed permanently on record, accompanied with meteorological notations and topographical descriptions—this system going on for a sufficient number of years through cycles of epidemic changes, would at length accumulate a mass of facts such as has never yet been afforded to medical science, and from which could be drawn reliable scientific and practical deductions valuable beyond the bounds of human computation;"[1] and those engaged in the origination and prosecution of a plan attended by such results, would certainly be honored by succeeding generations enjoying their benefits.

Receiving suggestions from astronomy and nautical science, a medical observatory should be established in every neighborhood as well as in every hospital, every fort, and every camp throughout the land; and a medical *log-book* should be kept by every physician and surgeon, who sails however small a craft.

The great science of the heavens has been built up by recorded observations long continued, of the relative positions and movements of the stars and planets; and the science of the ocean—its physical geography has been brought to a high state of perfection by collating the facts contained in the daily records of the many vessels which, for a series of years, have traversed its surface. From these simple records of the stars, the astronomer now predicts the exact position of the heavenly bodies at any future period, however distant, and foretells the return of the long lost comet with a precision that fills us with wonder and awe; and in navigation, the vast old ocean's winds and streams are computed by figures and designated upon charts, upon which the mariner can rely with as

[1] Report on Plans of Organization of State and County Medical Societies. Transactions of A. M. Association, 1856.

firm confidence as upon the waxing and waning of the apparently inconstant, but regularly changing moon.

In nature everywhere, a limited view, or the observance of a few facts, is likely to lead to error. By enlarging the view and extending the number of facts, these errors can alone be corrected. In every department of knowledge, the results of statistics are curious and invaluable. In medicine, a science based upon definite facts, and legitimately consisting of deductions from them, statistics, which are but records of large numbers of facts, constitute the very foundation of all that is most valuable. Could such statistics as might be produced by the efforts of our whole profession, scattered throughout this wide extending country, be rendered accessible, some future medical philosopher would construct a system of deductions which might explain the causes of diseases, and point to their preventions, if not their remedies, with as much precision as the path of the comet is now traced; or the winds, and tides, and streams of the ocean, are reduced to a system for the guidance of fleets.

Your Committee have been induced to dwell upon this subject, from a deep conviction of its importance to our literature. Such a body of facts as might be accumulated from so many sources, would give a weight to inductions, and a breadth to generalizations, which would commend our works based upon them to the attention of the world. As the work is great, the effort required for its accomplishment is great also; yet, should each one of the many contribute his quota, which he could really do with but little labor, the work, though so great, would be accomplished.

Various other minor measures for improving our literature, such as the offering of prizes for the best essays, the designation of the best inaugural theses, the formation of medical libraries and reading clubs, &c., and the influence of the thorough organization of the profession into societies, have been recommended and sufficiently dwelt upon by former committees, and they commend themselves to all—as in their sphere they are calculated to do much good.

The enactment of an *international copyright law* has been urged with much warmth by most of those who have reported upon this subject, as an important means for developing our national literature; this recommendation being based upon the assumption that

the extensive circulation of foreign, and particularly of British medical works, is among the chief causes which obstruct its progress.

Although this subject has been so fully discussed on former occasions, your Committee will close their report by some suggestions upon it.

In the very able report, presented to this body two years since, on the "Causes which Impede the Progress of American Medical Literature," it was in substance stated that, having the same origin and speaking the same language with the inhabitants of Great Britain, we have a natural desire to know what they think and say upon subjects in which we have a mutual interest. As our desire to read English books cannot, from their high price, further enhanced by impost duties, be readily gratified from the English press, the republication of these works in this country, not being prevented by any international copyright law, has become an extensive business; and, while a source of wealth to various large publication houses in the Atlantic cities, the works of English authors are afforded to our people at less than half the cost of the same works to the British reader. This gives many English books a larger circulation here than in their own country; but, while thus supplying our people liberally with mental nourishment, it is alleged by the distinguished reporter to have the effect "to repress home productions, and retard the development of a national literature of our own."

So far are the statements respecting the circulation of English works among us true, that some have been first collected together from British periodicals, and published in a separate form in this country, while several have passed through more editions here, than in the place of their nativity; and the number of British works, at the present time circulating among us, is greater than of native productions.

In determining whether this state of things is a matter of regret or of rejoicing, whether it should be checked by an international copyright law, or permitted to continue, we must consider its effects in different relations;—upon the immediate condition of the profession and the public, upon native authors, upon the character of our literature, and upon the honor and glory of our country; and as however expedient for the present any course may appear, it cannot be permanently beneficial if in principle it is essentially

wrong, the question of the moral right of copying and using thus the productions of foreign authors should receive attention.

Of the immediate effect upon the public of a general circulation of foreign works, there seems scarcely a difference of opinion. The distinguished reporter already referred to, doubtless expressed the general opinion when he said, that "this practice of publication is of great advantage to the public; for it serves to diffuse among the people, in a cheap and accessible form, a vast amount of knowledge that would otherwise be beyond their reach. It brings the works of our transatlantic brethren directly to our doors, at the same time that it serves to extend the name and fame of the authors." It indeed furnishes the masses of the profession in this country the greatest facilities for possessing the profoundest and most attractive productions of Europe, which, from the high prices at home, are excluded from very many of their own practitioners. This gives the great body of our professional men a decided advantage over those of Europe; and if our physicians were as thoroughly educated in the beginning as their transatlantic brethren, this free literature would render them as much superior to European practitioners in scientific knowledge, as they now are in practical tact.

The effect of this abundance and cheapness of foreign literature upon our native authors is asserted to be injurious; and at first view, if only their pecuniary interests be considered, such would seem to be the fact. It is doubtless truly alleged, that when the native author, after much labor and toil, places his manuscript in the hands of the publisher, he is told that the market is so fully occupied with works upon the same subject, that, in a pecuniary point of view, the enterprise must be a doubtful one; that if the work sells well, he may receive a few hundred dollars for a subsequent edition, but that at present the value of his copyright can hardly be reckoned above zero. This cannot be regarded as encouraging, certainly, and seems to put a decided tarnish upon an author's golden prospects, reducing him to thoughts of the prospective fame of his literary labors, as a solace and recompense. But yet, is it quite certain that if the medical public had not been encouraged to purchase books and read them, by the cheapness of foreign reprints, that this native work would have received any better encouragement? Do those who purchase and read many English works, consequently possess themselves of less American? Do not those who have read what the English have written, wish to read also what the Americans have to offer? Has not the free-

dom of access to European literature made us eminently a reading people? And will not a reading people patronize their own authors, if those authors are worthy of patronage? Instead of readers being diverted from native works by the publication of so many foreign, authors have most to fear from a state of ignorance and indifference in which people do not read. Any common peddler of books in visiting a house, would expect to dispose of his wares with more certainty where he saw other books, than where he saw none. He well understands that to dispose of one book leads to the subsequent sale of others. Reflection upon these common principles may diminish the regrets of authors and the friends of authors, because foreign works abound. If native works possess merit, though their authors may be discouraged by publishers, they will sell, whatever foreign works are in market. The *United States Dispensatory* sells though Christison's is in the book stores; and *Dunglison's Physiology* is bought, though Carpenter's is for sale. Few would be less likely to read Wood or Beck because of having studied Headland or Pereira; or would neglect Gross, because of having read Rokitansky.

The effects upon authors of the general distribution of foreign works of high merit, in other respects than their pecuniary interests, is worthy of notice. It has been said to "depress native talent, native genius, native aspiration and enterprise." This can only be true in case, and in so far as the circulation of the foreign work prevents the sale of the native; for it must be acknowledged that writing for readers of knowledge and cultivation, of intelligence and taste, such as are likely to be produced by reading many works, and preparing books for the market in view of the highest competition, will stimulate authors to their strongest efforts. When not altogether prevented from writing by this competition, they certainly have inducements to write better.

The influence of reprints upon our literature, aside from the interests of authors, must be considered in relation both to its quantity and quality. If it be admitted that the production of an inferior class of compendiums, and even a better class of compilations is discouraged by the presence of foreign books of a similar kind, there can be no doubt that from the effects of competition as already suggested, the quality of such works as are produced will be higher. This position is maintained by another distinguished reporter and author (Dr. A. Stillé), who advocates an international copyright law. In his most able and eloquent report for 1850, he

says: "It is evident that so far as the republication here of foreign books is hurtful, it can be so only by diminishing the *number* of American works; it must just as certainly improve the quality of those which are actually published." But as already suggested, this foreign competition does not lessen the demand for original works of merit, and it is this class of works alone which it is important to have produced. It is the production of original observers, and thinkers, and writers; the works which show, in their composition, extensive learning, thorough investigation, accurate observation and experiment, correct appreciation, rigid analysis and deduction, enlarged generalizations, systematic arrangement, and ease, conciseness and clearness of expression, which add real value to a nation's literature, and glory to its name.

But should it be admitted that the pecuniary interests of a few authors are injured by the free circulation of foreign works, those interests sink into utter insignificance when placed in opposition to the intellectual and scientific wants of a great profession and a great people, and should it even be admitted that by the same means the variety and richness of our native literature is diminished, it should be remembered that the glory of our nation chiefly consists in the general intelligence and welfare of the people. It does not so much depend upon the large accumulations of knowledge which may exist with individuals, as upon the diffusion of knowledge throughout the masses; not so much upon the brilliant reputation of the few, as the intellectual wealth and enjoyment of the many. If then it be admitted that by the free circulation of foreign works the great masses of the profession and the community are benefited, our regrets need not be intense, should some authors feel aggrieved.

But do the facts indicate that, under the present free system of foreign competition, our medical literature has been retarded? According to the course of argument we have indulged, such should not be the case. To sustain the logic we appeal to the facts. We point to our almost infant country and infant literature, and ask: Where under the whole heavens was ever a country of twice our age, and with half our literature? It is not claimed that our literature is perfect. That which is in its infancy cannot be mature. The springing plant cannot be crowned with flowers. But if our literature has not yet great expansion of branch and leaf, it has depth of root and vigor of stem. Its growth has been rapid; it has prospered exceedingly. If we are not allowed to regard it as

near perfection, we are encouraged to expect greater improvement. Our country is young, and our medical literature is younger still. As was strikingly said on another subject, "If this idea is not flattering to presumption, it is favorable to hope, for all that is not behind us is before us; it is better to have a future than a past."[1]

But, as a final question to be considered in this report: Have we a right, in justice and honor, to copy and multiply a foreign book, without the consent of the author? Should we, from a sense of moral right, join with Great Britain, in enacting an international copyright law? Your Committee are aware of the delicacy of this general question, and the feelings its discussion is apt to excite. It might be suggested that such a discussion would be more appropriate by the persons, and in the place where there is power to act. But the precedent of its discussion in this body is established, and we are so frequently taunted with "pirating" from our British brethren, that some suggestions on the subject may not be out of place.

The fact that such vigorous attempts as were put forth a few years ago, so utterly failed to secure an international copyright law, is an indication that either the people, through their representatives, have failed to see their obligations to enact such a law, or are indifferent to the demands of justice and honor. To spring at once to the latter conclusion is neither charitable, respectful, patriotic, nor just. Whatever may be the absolute right or wrong in the case, the great body of intelligent and conscientious people, constituting the intellectual and moral power of this nation, do not feel that their duty requires them to impose such a tax upon the knowledge of the country as the operation of the law in question would involve. Have they reasons for declining to impose such a tax? Have they plausible arguments to sustain them in thus refusing to restrict the freedom of knowledge? They doubtless think they have many. A few of these reasons will be suggested.

In the first place, the right of property in an author to the work he has given to the world, is not as clear as at first might be supposed. By the laws of no nation is the right of subject or citizen to property in his published work absolute and perpetual. With us, all shadow of right is limited to fourteen years; and no right can be clear and conclusive, in the nature of things, independent of enactments, for a certain limited time, and afterward be null and

[1] Cousin's History of Modern Philosophy.

void. The right to ordinary property is perpetual. All laws ever enacted on the subject, recognize a distinction between the copyright of a book, and ordinary property; and it is a matter of great doubt whether copyright laws are based upon the idea of right of property at all, or whether they have not their foundation rather in the principle of promoting the public good, by offering rewards for the production of original works.

The copyright of books seems based upon the same principle as patent rights for inventions. The one is granted as an expedient to encourage literature; the other to encourage improvements in the mechanic arts. In the absence of positive law, there could be no moral impropriety in copying a piece of mechanism which was exposed to public inspection, or in copying a book published and sent abroad. If the two cases are not absolutely parallel, they are so analogous as to render a distinction difficult; and, if this Association by its excellent code of ethics—a code approved by all honorable members of the profession everywhere—can justly prohibit the inventor of a surgical instrument from restricting the use of it by a patent, on what ground of analogy can it be pronounced robbery for an American publisher to copy, and give to the use of the profession, at the price of publication, a foreign book? If the granting of a copyright be based upon the notion of bestowing a reward for the encouragement of citizens to produce works of merit, it will be difficult to convince the American people of their obligation to extend those rewards to subjects of foreign nations.

It is presumed that, in a business point of view, the British author prepares his work for the people of his own nation, and with reference to the remuneration he expects from them. It is not surprising that those who thus look upon the subject should fail to see that any injury, and consequent injustice, is done to the foreign author in copying his work, and thus, without additional effort on his part, allowing him to be read by a greater number, thus extending "his name and fame."

There is at least some plausibility in the idea that each nation is expected to encourage and reward its own authors, so far as pecuniary encouragement and reward are required. If each nation makes sufficient provision for its own, all certainly will be provided for.

But, supposing it be established that the right of an author in his published work is as clear and absolute, as perpetual and widely-extended as in any other property his labor has produced; is it possible so to balance the scales of justice, as that an exact equiva-

lent shall be returned to the author by those making use of the work—by those availing themselves of the results of his labor? Can even an approximation to such equivalent be secured? A little reflection will show that it is quite impracticable. No public man receives from all he benefits the equivalent of his labor.

Although in nature, the general principle of compensation holds good, as applied to individual instances, it often entirely fails. For whatever labor we perform, we may in a general way receive our just reward, but we do not and cannot receive from each individual an equivalent for labor bestowed, or favors conferred. In an important sense, the human family is a unit. Labor bestowed upon humanity is compensated for by humanity, though the individual benefited by such labor may be unable or unwilling to make a return. In fact, in a certain sense, each department of the universe is a unit. The vegetable draws nourishment and support from the soil, and the law is that the soil shall be compensated for the draft. But the particular spot of soil may in no way be remunerated by the plant which drew nourishment from it, though it is certain that the earth shall, sooner or later, receive back the elements which the plant has taken. An animal crops an individual plant—it may be, completely destroys it forever; but the vegetable kingdom, through the mother earth, receives from the animal all that was yielded.

Now, in that unity of society into which every human being enters, services of necessity, and offices of kindness, are constantly rendered and received. The helplessness of infancy, of age, and infirmity, demands assistance; and acts of mutual aid are ever required. Governments must be sustained, rights must be protected, poverty must be sheltered, youth must be educated. Individuals are required to contribute labor, or property, the fruit and representative of labor, to all these purposes. The individual thus contributing does not expect personally to receive a direct pecuniary return. Of those of large possessions, much is required. In each act of disbursing duty, though a pure gratuity may possibly be granted, usually either a loan is made, or a debt discharged to humanity. If a debt be discharged, it may not be to the individual with whom it was contracted. If a loan be made, the lender may not look to the individual recipient for a return—but the return will be received from society—from the race. So of the recipient of humanity's bounty. If it be in his power, he is expected in duty to make a return—not, perhaps, to the individuals furnishing the aid; this, indeed, may be beyond his reach: but his return

must be made to society at large, or to those members of society he shall meet with, who may be in need. The child that is nursed, and the youth that is educated at the expense of others, pays to society, to the world of humanity, a full compensation. If he does his duty as a man, he makes in that manhood a return, with interest, for all in his childhood he received.

On this plan is constructed all society. Thus it is always, and everywhere; between individuals, in smaller communities, in states, and between nations. It is utterly vain to insist upon the exact property rights of individuals in society. In the strict sense indicated, they cannot be maintained. In that stricter sense, they do not, in fact, exist. More or less of personal rights are, in all societies, yielded for the public good.

Now, in accordance with these general principles, so fully stated, the peculiar condition of our country—its position, its age, its relations to other nations— to the past and to the future, produce in it certain necessities, and give it certain claims—necessities which must be supplied, and claims which the world must respect.

Our locality has an influence upon our character, our science, our literature, and our claims upon others. We are upon a new continent, have a vast territory, are in neighborhood of imperfect governments. We have much to subdue, to regulate, to establish. We have great internal seas, and extended rivers, which together with our railroads invite to travel, to change, to commerce. Our people are from diversified sources. They have relations with all parts of the world, and possess extended knowledge of its affairs. The material and practical are thus pressed upon us. Our youth as a nation has been sufficiently referred to.

With all these practical duties and affairs, we have not yet had time to perfect many great scholars. Amid the multiplicity of objects of thought and action which surround us, we have not yet found time for the minuter study of any limited number. This country is not now the place for the development of the individual in limited and special directions. But it is the place for giving individuals a wide range of knowledge, though less may be known minutely and perfectly; and it is also the place for the diffusion of knowledge among the whole people; and as previously stated, it is above all others the place for making the knowledge of others—the results of others' labors practically useful—of showing the diversified applications, and the practical value of scientific truths. In this we excel. Here, in the great economy of improvement, is

our sphere. This is our place in the great brotherhood of science and art. This is our position in the republic of letters.

We have, then, in this economy, a fixed place, and a manifest destiny. That place we must maintain, and that destiny fulfil. We may be charged with appropriating the materials, the results of the labors of others. We do and we must thus appropriate. Our necessities and our destiny demand it. We must have knowledge cheaply, freely, unobstructedly. The *masses* of our profession, and the *people* must have knowledge. In the great family of enlightened nations, we are the last born. Our scientific and literary wants are beyond our own capacity of supply. In our youth we must be sustained. The mother that bore us, our elder brothers must help us. We are already making a return, particularly in the department of practical results. Scarcely a patient in Europe submits his flesh to the surgeon's knife, but has the keen anguish averted by our own discovered anæsthesia. Perpetual incense of praise and thanksgiving ascends to God and America for this great boon. In our very first lispings we taught the people of Europe to avert the lightning's stroke; and in later, but still youthful accents, we have instructed them to make that lightning do their bidding. We are then in our youth making some returns to the present Europe; but in our manhood we shall make greater returns to the future humanity. In our growing youth we may appropriate more than we yield. In our full maturity we shall yield more than we appropriate. We may be borrowing of the present, but we are paying at least our annual interest; and the full principle and interest, compounded at that, shall be returned, followed by heavy advances to the future humanity.

Not only in science and literature, but in every department of human enterprise and improvement, our nation has its allotted position and work. Our immense country must be developed for the race. From a higher necessity than that which man controls, and in the name of civilization which must be advanced, we have taken, and must take the hunting grounds of the red man. The canals and railroads of the North have required, and still require the labor of the Celt. The rice, cotton, and sugar-fields of the South, the labor of the African. The hunting grounds and the labor are necessities. The remuneration for them should be just, but must be such as is practicable.

Not only do our necessities and our destiny require of others these lower departments of labor, but they require the highest also.

We must have the results of European thought, and scientific investigation. We will make such immediate returns as we can, reserving the remainder to be paid to posterity. This is the economy of nature. This indeed is the law of Heaven.

The thought will bear repetition, that labor, especially the high and beneficent labor of our profession, must often be given to humanity without the possibility of arranging an exact equivalent, or, in a pecuniary sense, of an equivalent at all. It is doubtless best that it should be so. Cold, exacting, legal justice, if exclusively followed, would destroy beneficence, converting it into selfishness. It is even malignity which exacts its pound of flesh. In the economy of Providence, every good deed shall receive at length its due reward—the reward of those deeds being most abundant, in which the accompanying motives are most disinterested and pure.

Without attempting to decide *ex cathedra* the absolute right of all the questions connected with the demands for an international copyright law, yet in view of the state of things which at present exists and is likely to continue, your Committee have thought proper to submit the foregoing considerations, feeling assured that similar general sentiments have an abiding lodgement in the minds of our people, reconciling their consciences to the course they pursue. They by no means regard themselves as acting dishonorably or wrong in copying the works of foreign authors, and using them for the advancement of knowledge and truth. In not regarding as paramount the very doubtful claims of these individual rights when set up in society in opposition to apparent general good, they are acting upon ideas universally prevalent, and which have been carried to a much greater extent in Europe than among ourselves. What other sentiments than those which recognized the superior claims of the necessities of civilization, and the higher interests of the race, could have satisfied the enlightened British conscience, while that nation has been extending its conquests throughout the world? In the policy of that great people, personal rights, however clear and positive, have ever yielded to their views of public good. And certainly a nation that is subverting governments, subduing empires, and levying contributions upon the millions of India, strangers in the East, for the ostensible purpose of extending a superior British civilization and British knowledge, should not complain, if, without trouble to its people, what they consider their superior knowledge, is appropriated and improved upon by their own offspring in the West.

The foregoing remarks have proceeded upon the assumption, that all property, both common and literary, usually claimed by individuals, is the fruit of their sole and exclusive labors; but really the accumulation of property of any kind seldom depends upon exclusive and unaided individual efforts. Each draws in a large degree the knowledge upon which his power to accumulate is based, from a common stock. He of necessity brings to his aid the experience and the labors of others. In literary property this is peculiarly the case. Books entirely and strictly original are not to be found. Most books are but separate collections of certain portions of the common stock of knowledge, and whatever grains of originality they possess, should go to replenish that common stock in which all participate. Indeed, so far from being original are many, even of the better class of medical works, that some of those transatlantic productions, whose republication among us has been a subject of complaint and accusation, contain whole chapters which are little else than literal translations of other, and to them, foreign works. Whether it is less honorable for a publisher to reproduce a foreign work, faithfully following the copy and retaining the author's name on the title page, or for a writer to appropriate without acknowledgment, under the guise of another language, or of a rearrangement however artful, the productions of others, it cannot be difficult to determine; and certainly the good taste of writers indulging such practices, yet denouncing publishers who at least give the writers full credit for all they produce, cannot be a subject of high admiration.

In bringing their labors to a close, the Committee present the following as a very brief *résumé* of some of the leading positions in the report.

The periodical literature of the United States is regarded as possessing great abundance, variety, richness, and general excellence; and though still possessing defects, is constantly improving. Many of the contributions are of great weight and value, indicating an enterprising and industrious profession. Serious defects are regarded as existing in the review department, arising mainly from the fact that the income of the journals will not justify pecuniary disbursements for literary labor; and editors necessarily engaged in other pursuits cannot command the time, if all possessed the ability to do the work thoroughly and well. A few well supported journals in place of the many but illy sustained, might tend to correct this

evil; but the multiplicity of local journals is considered as peculiarly beneficial, by collecting from a greater variety of sources a larger number of facts, and developing the powers of a larger number of writers. The interests of this part of our literature demand a more prompt and liberal pecuniary support.

The number of original American medical works is increasing, and their character is improving, and in some respects, particularly in practical utility, they will not suffer in comparison with those of Europe; yet serious imperfections exist, and decided improvements are demanded. Great and permanent improvements in medical, as in general literature, must be gradual, depending more upon the advancement of education, of taste and intelligence, than upon any specific measures which may be adopted. Still various particular measures, such as the frequent writing of medical theses during professional pupilage, and keeping systematic records of cases when in practice, would do very much in hastening on improvement. But for the greatest perfection of our literature we must wait the fuller development of our country, and for those changes of time and circumstances which shall produce a larger number of devoted savans and scholars, placing them in situations where a variety of absorbing pursuits shall not prevent the concentration of great talents upon a comparatively limited range of subjects.

Respecting the reprint of foreign works, it is held: that while the free circulation of the best class of these works among us increases the knowledge and improves the taste of the masses of the profession, it does not interfere with the production of the higher order of original works; and that the moral obligation of our government to join with Great Britain in the enactment of an international copy-right law, is by no means clearly established.

In conclusion, your Committee would say, that if as sentinels placed upon the walls of our Medical Zion, they are asked in relation to its literature, "What of the night?" the response must be, "The morning cometh." The darkness which has hung over that literature is breaking away. There is at least dawning in the east, and though the chariot of day may roll on but slowly, the full effulgence will come at last.

A. B. PALMER, *Chairman.*

APPENDIX TO REPORT ON MEDICAL LITERATURE.

ORIGINAL MEDICAL WORKS.

Title.	Author.
Physical Exploration and Diagnosis of Diseases affecting the Respiratory Organs. Philadelphia: Blanchard & Lea, 1856.	Austin Flint, M. D., &c. &c., Louisville, Ky.
Yellow Fever, considered in its Historical, Pathological, Etiological, and Therapeutical Relations, &c. Philadelphia: Blanchard & Lea, 1855.	R. La Roche, M. D., Philadelphia.
Letters to a Young Physician just entering upon Practice. Boston, 1855.	James Jackson, M. D., &c. &c., Boston.
An Introduction to Practical Pharmacy. Philadelphia: Blanchard & Lea, 1856.	Edward Parrish, Principal of the School of Prac. Phar., Phil., etc.
A Treatise on Medical Jurisprudence. Philadelphia: Kay & Brother, 1855.	Francis Wharton and Moreton Stillé, M. D., &c.
History of the American Medical Association. Philadelphia: Lippincott, Grambo & Co., 1855.	N. S. Davis, M. D., &c.
Elements of Medicine, &c. Philadelphia: 1856. Blanchard & Lea.	S. H. Dickson, M. D., &c. &c., Charleston, S. C.
Army Meteorological Register, &c. &c. Washington, 1855.	Thomas Lawson, M. D., &c., U. S. Army.
A Treatise on the Practice of Surgery. Philadelphia: 1856. Lippincott & Co.	Henry H. Smith, M. D., &c., Philadelphia.
Clinical Lectures on Surgery. Philadelphia: J. B. Lippincott & Co., 1855.	M. Nélaton, M. D., &c., reported by W. F. Atlee, M. D.
The Medical Profession in Ancient Times. An Anniversary Discourse. New York, 1856.	John Watson, M. D., &c., New York.
The Cause and Curative Treatment of Sterility, &c. New York: Dewit & Davenport, 1856.	A. H. Gardner, M. D., A. M., &c.
Cases in Midwifery, with remarks. New York, 1856.	Thomas F. Cock, M. D., &c., New York.
A Treatise on Therapeutics and Pharmacology. Philadelphia: J. B. Lippincott & Co., 1856.	George B. Wood, M. D., &c. &c., Philadelphia.
Human Physiology, Statical and Dynamical. New York: Harper & Brother, 1856.	John W. Draper, M. D., LL. D., &c., New York.
The Practical Anatomist, &c. Philadelphia: Blanchard & Lea, 1856.	J. M. Allen, M. D., &c.
An Outline of Medical Chemistry, for the use of Students. Philadelphia: Lindsay & Blakiston, 1855.	B. H. Rand, M. D., &c.
Statistical Report on the Sickness and Mortality in the Army, &c. Washington, 1856.	R. H. Coolidge, M. D., directed by Thomas Lawson, Surgeon General U. S. Army.
Opinions on the Parrish Will Case, New York.	John Watson, M. D., and others.
Catalogue Raisonné of the Medical Library of the Pennsylvania Hospital. Philadelphia, 1857.	Emil Fischer, M. D., &c., Philadelphia.
Indigenous Races of the Earth.	Nott and Gliddon, and other contributors.

ORIGINAL MEDICAL WORKS.

Title.	Author.
Diseases of the Circulatory System. Philadelphia: Blanchard & Lea, 1855.	S. H. Dickson, M. D., LL. D., &c., Charleston, S. C.
Investigations, Chemical and Physiological, relative to certain American Vertebrata. New York, 1857.	Joseph Jones, M. D., &c.
Climatology of the United States, &c. Philadelphia: J. B. Lippincott & Co., 1857.	Lorin Blodget.
The Physician's Visiting List and Book of Engagements for 1858.	
A Collection of Remarkable Cases in Surgery. Philadelphia: J. B. Lippincott & Co., 1857.	Paul F. Eve, M. D., &c.
Human Histology. Philadelphia: Blanchard & Lea, 1857.	E. R. Peaslee, A. M., M. D., &c.
The Principles and Practice of Obstetrics. Philadelphia: Blanchard & Lea, 1858.	Henry Miller, M. D., &c., Louisville, Ky.
Introduction to Structural and Systematic Botany, &c. New York, 1858.	Asa Gray, M. D., &c.
Mineral and Thermal Springs of the United States and Canada. Philadelphia: Parry & McMillan.	John Bell, M. D.
Researches in Primary Pathology, and the Origin and Laws of Epidemics. 2 volumes. Philadelphia, 1858.	M. L. Knapp, M. D.
Experimental Researches applied to Physiology and Pathology. New York.	E. Brown-Séquard, M. D., &c.
Researches on Epilepsy: Its Artificial Production in Animals, and its Etiology, Nature, and Treatment in Man. Boston, 1857.	E. Brown-Séquard, M. D., &c. &c.

ORIGINAL MEDICAL WORKS—PAMPHLETS.

Title.	Author.
An Essay on the Intermittent and Bilious Remittent Fevers, &c. Charleston, 1856.	E. L. Gaillard, M. D.
A Paper on the Effects of Lead on the Heart. New York, 1856.	John Corson, M. D., &c.
Report of the Board of Bellevue Hospital upon Constitutional Syphilis. New York.	A. Clark, M. D., &c.
Bronchial Injections. New York, 1856.	Horace Green, M. D., &c.
Treatment of Displacements of the Uterus, with the Abdominal Spring Pessary.	J. McF. Gaston, Columbia, S. C.
A Biographical Notice of T. Romeyn Beck. New York, 1856.	E. H. Van Deusen, M. D.
On the Douche, and a New and Improved Mode of its Application, &c.	G. P. Hackenbury, M. D., Springfield, Ohio.
Remarks on Vesico-Vaginal Fistula, &c. 1856.	N. Bozeman, M. D., Montgomery, Ala.
History of the Ligature applied to the Bronchio-Cephalic Artery, &c. 1856.	Paul F. Eve, M. D., &c., Nashville, Tenn.
Assimilation, Consumption, and Scrofula. Louisville, 1856.	B. H. Washington, M. D., Hannibal, Mo.
Experiments upon Digestion. Philadelphia, 1856.	Francis G. Smith, M. D., &c., Philadelphia.
The Sunburnt Appearance of the Skin as an early Diagnostic Symptom of Supra-Renal Capsule Disease. New York, 1856.	Isaac E. Taylor, M. D., &c.

ORIGINAL MEDICAL WORKS—PAMPHLETS.

Title.	Author.
Essay on the Physiology of the Nervous System, &c. Gloucester, Mass., 1856.	Benjamin Haskell, M. D., Rockport, Mass.
Sea-Sickness: its Cause, Nature, Symptoms, &c. New York, 1856.	Ml. Nelken, M. D., &c.
A Claim of Priority on the Discovery of, and also the Naming of the Excito-Secretory System of Nerves. Philadelphia: J. B. Lippincott & Co.	H. F. Campbell, M. D., &c. &c., Augusta, Ga.
Report on the Origin of the Yellow Fever in Norfolk, during the summer of 1855. Richmond, Va., 1857.	Committee of Physicians.
Remarks upon Fracture of the Scapula.	L. A. Dugas, M. D., Ga.
Surgical Cases, communicated to the Boston Society for Medical Improvement.	George H. Gay, M. D., &c.
Report of an Operation for Removing a Foreign Body from beneath the Heart. San Francisco, 1857.	E. S. Cooper, A. M., M. D., San Francisco, Cal.
Biography and Memorial of the late Dr. S. P. Hullihen, of Wheeling, Va. Philadelphia, 1858.	E. B. Gardette, M. D.
Report of a Case of Hydrophobia. Philadelphia, 1856.	W. L. Atlee, M. D., Phila.
The Therapeutical Powers and Properties of Veratrum Viride. Second ed.	W. C. Norwood, M. D., Charleston, S. C.
On the Treatment of Iritis, without Mercury. Boston, 1856.	H. W. Williams, M. D., &c., Boston.
Quarterly Summary of the Transactions of the College of Physicians of Philada., Jan., 1857.	
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Researches into the Structure and Functions of the Kidney.	C. E. Isaacs, M. D., &c.
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Early History of the Operation of Ligature of the Common Carotid Artery. New York, 1857.	James R. Wood, M. D., &c.
An Inaugural Thesis on Intra-Capsular Fractures of the Cervix Femoris. New York.	John Geo. Johnson, M. D., &c.
Physician's Tabulated Diary, &c. Richmond, Va., 1856.	A Physician of Virginia.
Animal Decomposition the Chief Cause of Cholera. Philadelphia.	Henry Hartshorne, M. D.
Anniversary Discourse before the New York Academy of Medicine, on Silver Sutures in Surgery.	J. Marion Sims, M. D.
Puerperal Fever: Its Causes and Mode of Propagation. New York.	J. M. Smith, M. D.
Compound Dislocation of the Long Bones. Buffalo.	F. H. Hamilton, M. D.
Memoir of Moreton Stillé, M. D.	S. L. Hollingsworth, M. D.
Report of the New York Marine Hospital.	E. Harris, M. D.
Lectures on the Sulphate of Quinia.	A. B. Palmer, M. D.
Delirium Tremens: Its Nature and Treatment.	C. S. Tripler, M. D., U. S. Army.
Evidences of a General System of Medical Practice being taught by Scripture, and a comparison of this System with Rational Medicine, and Exclusive Homœopathy. Detroit, Michigan.	N. D. Stebbins, M. D., &c.
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Title.	Author.
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An Analytical Compendium of the Various Branches of Medicine, &c. 3d edition. Philadelphia: Blanchard & Lea, 1856.	John Neill, M. D., &c., and Francis G. Smith, M. D., &c., Phila.
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New Remedies, &c. Seventh edition. Philadelphia: Blanchard & Lea, 1856.	Robley Dunglison, M. D., &c., Philadelphia.
Hints on the Medical Examination of Recruits, &c. New edition. Philada., 1856.	Thos. Henderson, M. D., &c.
A Practical Treatise on the Urinary Organs. Second edition. Philadelphia: Blanchard & Lea, 1855.	S. D. Gross, M. D.
Lectures on Materia Medica and Therapeutics. 2d edition. New York, 1856.	John B. Beck, M. D., &c., New York.
The History, Diagnosis, and Treatment of the Fevers of the United States. Fourth edition. Philadelphia: Blanchard & Lea, 1856.	Elisha Bartlett, M. D.
Obstetrics: the Science and the Art. Third edition. Philadelphia: Blanchard & Lea, 1856.	Charles D. Meigs, M. D., &c., Philadelphia.
General Therapeutics and Materia Medica. Sixth edition. Philadelphia: Blanchard & Lea, 1857.	Robley Dunglison, M. D., &c., Philadelphia.
Synopsis of the Course of Lectures on Materia Medica and Pharmacy. Second edition. Philadelphia: Blanchard & Lea, 1855.	Joseph Carson, M. D., Philadelphia.
Chemical and Pharmaceutical Manipulations. Second edition. 1856. Lindsay & Blakiston.	Campbell Morfit, Prof. of Chemistry, &c.
The Cause and Prevention of Yellow Fever in New Orleans, and other Cities in America. Third edition. New York, 1857.	E. H. Barton, A. M., M. D., &c.
The Physician's Pocket Dose and Symptom Book. Second edition. 1857. Lindsay & Blakiston.	Joseph H. Wythes, A. M., M. D.
A Manual of Examinations upon Anatomy, &c. New edition. Blanchard & Lea, 1857.	J. L. Ludlow, A. M., M. D., &c.
Elements of Pathological Anatomy. Third edition. Philadelphia: Blanchard & Lea, 1857.	Samuel D. Gross, M. D., &c., Philadelphia.
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The Medical Student's Vade Mecum. Fifth edition. Phila., 1857. Lindsay & Blakiston.	Geo. Mendenhall, M. D., &c.
Introduction to Structural and Systematic Botany, and Vegetable Physiology. Fifth edition. New York, 1858.	Asa Gray, M. D., &c., Harvard University.
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Institutes of Medicine. 1858. Harper & Bros.	Martyn Paine, M. D., &c., New York.
United States Dispensatory. Eleventh edition, revised. 1858. J. B. Lippincott & Co.	Drs. Geo. B. Wood and Franklin Bache.

REPUBLICATIONS OF RECENT FOREIGN WORKS.

Title.	Author.
Clinical Lectures on Paralysis, &c. &c. Philadelphia: Lindsay & Blakiston, 1855.	R. B. Todd, M. D., F.R.S., &c.
Principles of Human Physiology, with their Chief Applications to Psychology, &c. Edited, with additions by Francis Gurney Smith, M. D., &c. Philadelphia: Blanchard & Lea, 1855.	Wm. B. Carpenter, M. D., &c.
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Digestion and its Derangements. New York: S. S. & W. Wood, 1856.	Thomas K. Chambers, M. D., &c., London.
The Principles of Surgery, 4th Amer. from the 3d London edition. Philadelphia: Blanchard & Lea, 1856.	James Miller, F. R. S. E., &c.
A Practical Treatise on Diseases and Injuries of the Eye. Philadelphia: Blanchard & Lea, 1855.	W. Mackenzie, M. D.
A Practical Handbook of Medical Chemistry. 2d London edition. Philadelphia: Blanchard & Lea, 1856.	John E. Bowman.
Diseases of the Rectum. 2d edition, London. New York, 1855. S. S. & W. Wood.	Richard Quain.
A Dictionary of Terms used in Medicine, and the Collateral Sciences. 7th edition, London. Philadelphia: Blanchard & Lea, 1856.	R. D. Hoblyn.
The Practitioner's Pharmacopœia and Universal Formulary. New York, 1856.	John Foote, London.
On Some Diseases of Women admitting of Surgical Treatment. Philadelphia: Blanchard & Lea, 1856.	Isaac Baker Brown, F.R. C. S., &c.
Atlas of Cutaneous Diseases. Phila.: Blanchard & Lea, 1856.	J. Moore Neligan, M. D., &c.
A Practical Treatise on Diseases of the Skin. Second American edition. Phila.: Blanchard & Lea, 1857.	J. Moore Neligan, M. D., Dublin.
Practical Treatise on the Diseases of Children and Infants at the Breast. Translated from the French, by P. H. Baird. New York: S. S. & W. Wood.	M. Bouchut.
A Practical Treatise on the Diseases of the Testis, and of the Spermatic Cord and Scrotum. Second American, from the second English edition. Philadelphia: Blanchard & Lea, 1856.	T. B. Curling, F. R. S., &c. &c.
The Diseases of the Heart and Aorta. Phila.: Lindsay & Blakiston, 1855.	William Stokes, M. D., &c., Dublin.
The Dissector's Manual of Practical and Surgical Anatomy. Third Amer., from the last London edition. Edited by Wm. Hunt, M. D., &c. Phila.: Blanchard & Lea, 1856.	Erasmus Wilson, F.R.S., &c.
On Diseases of Infants and Children. Edited, with additions, by Wm. V. Keating, M. D., &c. Philadelphia: Blanchard & Lea, 1856.	Fleetwood Churchill, M. D., &c.
Medical Jurisprudence. Fourth Amer., from fifth London edition. Edited by Edward Hartshorne, M. D., &c. Phila.: Blanchard & Lea, 1856.	Alfred S. Taylor, M. D., F. R. S., &c.
Lectures on the Principles and Methods of Medical Observations and Research, &c. Phila.: Blanchard & Lea, 1857.	Thomas Laycock, M. D., &c., F. R. S. E., &c.
Medical Notes and Reflections. From the third London edition. Philadelphia: Blanchard & Lea, 1857.	Sir Henry Holland, Bart., M. D., F. R. S., &c.
On the Constitutional Treatment of Female Diseases. Philadelphia: Blanchard & Lea, 1857.	Edward Rigby, M. D.

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Title.	Author.
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Elements of Inorganic Chemistry. Edited by Bridges and Watts. Second edition. Philadelphia: Blanchard & Lea, 1858.	Thos. Graham, F. R. S.
Handbook of Organic and Inorganic Chemistry. Fourth Amer. from the third English edition. Edited by J. M. Sanders, M. D., &c. New York: A. S. Barnes & Co.	Wm. Gregory, M. D., &c.
The Physician's Prescription Book, &c. Second Amer. from the twelfth London edition. Phila.: Lindsay & Blakiston, 1857.	Jonathan Pereira, M. D., &c.
Practical Anatomy. A new arrangement of the London Dissector. Phila.: J. B. Lippincott & Co., 1856.	D. H. Agnew, M. D., &c.
Exposition of the Signs and Symptoms of Pregnancy. From the second London edition. Phila.: Blanchard & Lea, 1857.	Wm. F. Montgomery, A. M., M. D., &c.
Lectures on the Diseases of Women. Part I. Diseases of the Uterus. Blanchard & Lea: Phila., 1857.	Charles West, M. D., F. R. C. P., &c.
A Manual of Medical Diagnosis. Blanchard & Lea: Phila., 1858.	A. W. Barclay, M. D., F. R. C. P., &c.
The Microscope and its Revelations. With an Appendix, containing the application of the Microscope to Clinical Medicine, &c. &c. By F. G. Smith, M. D., &c. Phila.: Blanchard & Lea, 1856.	Wm. B. Carpenter, M. D., F. R. S., &c.
The Obstetric Memoirs and Contributions of James Y. Simpson, M. D., &c. &c. Edited by W. O. Priestley, M. D., Edinburgh, and Horatio B. Storer, M. D., Boston, U. S. Phila.: J. B. Lippincott & Co., 1855. 1st vol.	
Second volume by same Authors and Publishers. 1856.	
Experiments on the Action and Sounds of the Heart.	Geo. Britton Halford, M. D., &c.
A Manual of Clinical Medicine, Physical Diagnosis, &c. Philadelphia: Blanchard & Lea, 1855.	T. H. Tanner, M. D.
A Popular Handbook on Sight and Hearing. New York.	Henry Clark, M. D.
Physiological Anatomy and Physiology of Man. Philadelphia: Blanchard & Lea, 1857.	Todd and Bowman.
How to Nurse Sick Children. New York: S. S. & W. Wood.	
The Pathology and Treatment of Leucorrhœa. Phila.: Blanchard & Lea, 1855.	W. Tyler Smith.

REPUBLICATIONS OF RECENT FOREIGN WORKS.

Title.	Author.
A Practical Treatise on Diseases of Women. Philadelphia: Blanchard & Lea, 1855.	Samuel Ashwell, M. D., &c.
The Principles and Practice of Obstetric Medicine and Surgery. With Notes and Additions, by W. V. Keating, M. D., &c. Philadelphia: Blanchard & Lea, 1855.	F. H. Ramsbotham, M. D.
A Conspectus of the Pharmacopœias of London, Edinburgh, and Dublin. Edited by C. A. Lee, M. D. New York: S. S. & W. Wood.	A. T. Thompson, M. D.
A Review of the Present State of Uterine Pathology. Philada., 1856.	J. H. Bennet, M. D., &c.

PRIZE ESSAYS.

Title.	Author.
Croup: its History, Nature, and Treatment, the Dissertation to which the Fiske Fund Prize was awarded, June, 1855.	Albert Newman, M. D.
Essay on Cholera Infantum, for which the Prize of the New York Academy of Medicine was awarded, March 5, 1856.	James Stewart, M. D., &c.
The History and Statistics of Ovariotomy, &c. The Dissertation to which the Prize of the Massachusetts Medical Society was awarded, May, 1856.	George Lyman, M. D., &c.
On the Effects of Climate on Tubercular Disease. The Dissertation to which the Fiske Fund Prize was awarded, June 6, 1855.	Edwin Lea, M. R. C. S., London.
Does Pregnancy accelerate or retard the Development of Tubercles of the Lungs in persons predisposed to this Diathesis? The Fiske Fund Prize Essay, June 4, 1856.	Edward Warren, M. D., Edenton, N. C.
What are the Causes and Nature of that Disease incident to Pregnancy and Lactation, characterized by Inflammation and Ulceration of the Mouth and Fauces, usually accompanied by Anorexia, Emaciation, and Diarrhœa; and what is the best mode of treatment? The Fiske Fund Prize Essay for June 3, 1857.	David Hutchinson, M. D., Indiana.
Cretins and Cretinism, Nashville, Tenn.	Geo. S. Blackie, M. D.
Rational Therapeutics; or, the Comparative Value of Different Curative Means, and the Principles of their Application. Boston.	Worthington Hooker, M. D., &c.

REPUBLICATION OF RECENT FOREIGN WORKS—TRANSLATIONS.

Title.	Author.
A Manual of Pathological Anatomy. Translated from the last German edition, by Wm. Edward Swaine, M. D., C. H. Moore, Edward Sieveking, M. D., and George E. Day, M. D., F. R. S. Phila.: Blanchard & Lea, 1855.	Carl Rokitansky, M. D., &c. &c., Vienna.
History of Medicine, from its Origin to the Nineteenth Century. Translated from the French, by Cornelius G. Comegys, M. D., etc. 1855.	P. V. Renonard, M. D., &c.
Physiological Chemistry. Translated from the Second edition. Phila.: Blanchard & Lea, 1855. Edited by R. E. Rogers, M. D.	Prof. C. G. Lehmann, M. D., &c.

REPUBLICATION OF RECENT FOREIGN WORKS—TRANSLATIONS.

Title.	Author.
Manual of Chemical Physiology. From the German of Prof. C. G. Lehmann, M. D. Translated, with Notes and Additions, by J. Cheston Morris, M. D. With an Introductory Essay on Vital Forces, by Samuel Jackson, M. D., &c. Phila., 1856.	Prof. C. G. Lehmann, M. D., &c.
New Elements of Operative Surgery. Translated by P. S. Townsend, M. D., etc. New York: S. S. & W. Wood, 1856.	Alf. A. L. M. Velpeau, Prof. of Surgical Clinique, &c. &c.
Obstetric Tables. Translated from the French, and arranged by O. A. Crenshaw, M. D., and J. B. McCaw, M. D. With three additional tables, by N. P. Rice, M. D. New York, 1856.	Dr. Pajot, Agregé Professor in the Faculty of Medicine, Paris.
A Manual of the Detection of Poisons by Medico-Chemical Analysis. Translated from the German by Wm. Elderhorsz, M. D., etc. New York, 1857.	Fr. Jul. Otto, M. D., &c. &c.
A Theoretical and Practical Treatise on Midwifery, &c. Second American edition, translated from the fifth French edition, by Wm. R. Bullock, M. D. Phila.: Lindsay & Blakiston, 1857.	P. Cazeau, M. D., &c. &c., Paris.

TRANSACTIONS OF MEDICAL SOCIETIES.

Title.	Where published.
Proceedings of the Sixty-Third Annual Convention of the Connecticut Medical Society, for 1855.	
Transactions of the Medical Association of Southern Central New York, at the Ninth Annual Meeting held at Elmira, 1855.	
Transactions of the Belmont (Ohio) Medical Society, for 1854–5.	
Proceedings of the Annual Meeting of the Medical Association of Texas, for 1853.	
The Transactions of the American Medical Association, Vol. VIII. for 1855.	Philadelphia.
Proceedings of the South Carolina Medical Association, at the Extra Meeting in Columbia, in 1854, and of the Annual Meeting in Charleston, 1855.	
Transactions of the South Carolina Medical Association at the Extra Meeting in Greenwood, 1855, and at the Annual Meeting in Charleston, 1856.	
Transactions of the Sixth Annual Meeting of the Medical Society of the State of North Carolina, held at Salisbury, N. C., 1855.	
Transactions of the State Medical Society of New York, at its Annual Meeting for 1856.	
Proceedings of the Convention, and of the Medical Society of California, for 1856.	
Transactions of the Seventh Annual Meeting of the Medical Society of the State of North Carolina, for 1856.	
Transactions of the Illinois Medical Society for the year 1856.	
Transactions of the American Medical Association for the year 1856. Vol. IX.	Philadelphia.
Transactions of the Fifth Annual Meeting of the Kentucky State Medical Society, for 1856.	

TRANSACTIONS OF MEDICAL SOCIETIES.

Title.	Where published.
Transactions of the Medical and Chirurgical Faculty of Maryland, at its annual Session, in Jan. 1856.	
Historical Sketches of Quarantine. An Address delivered before the Philadelphia County Medical Society, Jan. 1857, by W. Jewell, M. D., on the close of his official term as President.	
Transactions of the Medical Society of the State of New York, transmitted to the Legislature, Feb. 1857.	
Proceedings of the Sixty-Fourth Annual Convention of the Connecticut Medical Society, May, 1857.	
Transactions of the Eighth Annual Meeting of the Medical Society of the State of N. C., 1857.	
Transactions of the Medical Society of the State of Pennsylvania, at its Annual Session, held at Westchester, May, 1857.	
Therapeutic Cultivation, &c., an Address delivered to the Tennessee Medical Society, April, 1857. By E. B. Haskins, M. D., President.	Nashville.
An Address on the Life and Character of the late Prof. John Locke, delivered at the request of the Cincinnati Medical Society. By M. B. Wright, M. D., 1857.	New York.
Transactions of the Indiana State Medical Society, at its Eighth Annual Session, 1857.	
The Transactions of the New Hampshire Medical Society, Sixty-Seventh Anniversary, 1857.	
Transactions of the South Carolina Medical Association, at the Extra Meeting held in Sumter, 1856, and at the Annual Meeting in Charleston, 1857.	
Transactions of the Second Session of the Medical Society of California, 1857.	
Transactions of the Illinois State Medical Society for the year 1857.	
Discussion on Puerperal Fever, before the New York Academies of Medicine. Remarks by B. F. Barker, M. D., &c.	
Transactions of the Medical Association of the State of Alabama.	

REPORTS OF ASYLUMS.

Title.	
Report of the Butler Hospital for 1854.	
Report of the Bloomingdale Asylum for 1854.	
Report of the New York State Lunatic Asylum for 1854.	
Report of the New Jersey State Lunatic Hospital for 1854.	
Report of the Pennsylvania Hospital for the Insane, for 1854.	
Report of the Pennsylvania State Lunatic Hospital for 1854.	
Report on Insanity and Idiocy in Massachusetts, by the Commission on Lunacy, under resolve of the Legislature of 1854.	
Reports of the Provincial Lunatic Asylum of New Brunswick, for the years 1850, 1851, 1852, and 1853.	
Reports of the New Hampshire Asylum for the Insane, for the years 1854–5.	

REPORTS OF ASYLUMS.

Title.	
Reports of the Vermont Asylum for the Insane, for the years 1854–5.	
Reports of the Massachusetts Lunatic Hospital, Worcester, for the years 1854–5.	
Report of the Boston Lunatic Asylum, for the year 1854.	
Reports of the New York City Lunatic Asylum, for the years 1854–5.	
Reports of the Maryland Hospital for the Insane, for the years 1853–4 and 5.	
Reports of the Mount Hope Institution, for the years 1854–5.	
Reports of the Western Lunatic Asylum, Virginia, for the years 1854–5.	
Reports of the South Carolina Lunatic Asylum, for the years 1853–5.	
Reports of the Ohio Lunatic Asylum, Columbus, for the years 1854–5.	
Reports of the Eastern Lunatic Asylum, Lexington, Ky., for the years 1849, 1850–2–3–4, and 58.	
Reports of the Insane Asylum of Louisiana, for the years 1852–3.	
Report of the California Insane Asylum, for the year 1854.	
Report of the Bloomingdale Asylum, for the year 1855.	
Report of the Retreat, at Hartford, for the year 1854.	
Reports of the Friends' Asylum, Frankford (Phil.), for the years 1853–4.	
Report of the Government Hospital for the Insane, for the year 1855.	
Reports of the Massachusetts State Lunatic Hospital, at Taunton, for the years 1854–5.	
Report of the Northern Lunatic Asylum, of the State of Ohio, for 1855.	
Report of the Southern Lunatic Asylum, of the State of Ohio, at Dayton, for 1855.	
Report of the Western Lunatic Asylum of the State of Kentucky, for 1855.	
Reports of the Tennessee Hospital for the Insane, near Nashville, for the years 1852–3–4, and 5.	
Report of the Mississippi State Lunatic Asylum, at Jackson, for 1855.	
Report of the New Hampshire Asylum for the Insane, for 1855.	
Report of the McLean Asylum, for 1855.	
Report of the Butler Hospital for the Insane, for 1855.	
Report of the New York State Lunatic Asylum, for 1855.	
Report of the New Jersey State Lunatic Asylum, for 1855.	
Report of the Pennsylvania Hospital for the Insane, for 1855.	
Report of the Pennsylvania State Lunatic Hospital, for 1855.	
Report of the Indiana Hospital for the Insane, for 1855.	
Report of the New Jersey State Asylum, for 1856.	
Report of the Pennsylvania Hospital for the Insane, for 1856.	
Report of the Pennsylvania State Hospital, for 1856.	
Report of the Western Pennsylvania Hospital for 1856.	
Report of the Mount Hope Institution, for 1856.	

REPORTS OF ASYLUMS.

Title.	
Report of the North Carolina State Asylum, for 1856.	
Report of the South Carolina State Asylum, for 1856.	
Report of the Indiana State Hospital, for 1856.	
Report of the Illinois State Hospital, for 1856.	
Report of the Missouri State Asylum, for 1856.	
Report of the California State Asylum, for 1855.	
Report of the Maine State Hospital, for 1856.	
Report of the Vermont State Asylum, for the fiscal year 1855–6.	
Report of the McLean Asylum, for the year 1856.	
Report of the Butler Hospital, for the year 1856.	
Report of the Hartford Retreat, for the fiscal year 1855–6.	
Report of the King's County Asylum, N. Y., for the fiscal year 1855–6.	
Annual Report of the Physician-in Chief of the Marine Hospital at Quarantine. Presented to the Legislature of N. Y., February 4, 1857.	
Reports of the Friends' Asylum, Philadelphia, for the fiscal years 1855–6, and 1856–7.	
Report of the U. S. Government Hospital, for the fiscal year 1855–6.	
Report of the Ohio Central State Asylum, for 1856.	
Report of the Ohio Northern State Asylum, for 1856.	
Report of the Ohio Southern State Asylum, for 1856.	
Nineteenth Annual Report of the Board of Trustees and Officers of the Central Ohio Lunatic Asylum.	
Report of the Board of Managers of the Eastern Kentucky Lunatic Asylum, for 1856–7.	
Twenty-First Annual Report of the Vermont Asylum for the Insane.	
Report of the Idiot Asylum, New York.	

LIST OF MEDICAL JOURNALS IN THE UNITED STATES.

Title.	Editors.
American Journal of the Medical Sciences.	Dr. Isaac Hays.
North American Medico-Chirurgical Review.	Drs. S. D. Gross and T. G. Richardson.
Medical News and Library.	Dr. Isaac Hays.
Philadelphia Medical and Surgical Journal.	Dr. Jas. A. Bryan.
New York Journal of Medicine.	Dr. Stephen Smith.
American Medical Gazette.	Dr. D. M. Reese.
American Medical Monthly.	Drs. E. H. Parker and J. H. Douglass.
Boston Medical and Surgical Journal.	Drs. W. W. Morland and F. Minot.
Medical and Surgical Reporter.	Dr. S. W. Butler.
Charleston Medical and Surgical Journal.	Dr. J. D. Burns.
Virginia Medical and Surgical Journal.	Drs. McCaw and Otis.
St. Louis Medical Journal.	Drs. M. L. Linton and W. M. McPheeters.
New Orleans Medical and Surgical Journal.	Dr. Bennett Dowler.
New Orleans Medical News and Hospital Gazette.	Drs. E. D. Fenner and D. W. Brickall.
Cincinnati Lancet and Observer.	Drs. Mendenhall, Murphy, and Stevens.

LIST OF MEDICAL JOURNALS IN THE UNITED STATES.

Title.	Editors.
Ohio State Medical Journal.	Dr. J. Dawson.
Chicago Medical Journal.	Drs. N. S. Davis and W. H. Byford.
Buffalo Medical Journal.	Drs. S. B. Hunt and A. Flint, Jr.
Peninsular and Independent Medical Journal.	Drs. A. B. Palmer, and M. Gunn, and F. Stearnes, Pharmaceutist.
Nashville Medical Journal.	Drs. W. K. Bowling, R. C. Foster, and G. S. Blakie.
Memphis Medical Recorder.	Dr. D. F. Wright.
East Tennessee Medical Times.	Dr. R. O. Currey.
Southern Medical and Surgical Journal.	Drs. H. F. and R. Campbell.
Atlanta Medical and Surgical Journal.	Drs. J. P. Logan and W. F. Westmorland.
New Hampshire Medical Journal.	Dr. G. H. Hubbard.
Pacific Medical and Surgical Journal.	Drs. J. B. Trask and David Wooster.
American Journal of Insanity.	Officers of U. Asylum.
Oglethorpe Medical and Surgical Journal.	Drs. Byrd and Steele.
Savannah Journal of Medicine.	Drs. Sullivan, Harris, and Arnold.

FOREIGN MEDICAL JOURNALS REPUBLISHED.

Title.	By whom issued.
London Lancet.	Dexter & Brother, New York.
British and Foreign Medico-Chirurgical Review.	S. S. & W. Wood, New York.
Braithwaite's Retrospect.	Stringer & Townsend, New York.
Ranking's Abstract.	Lindsay & Blakiston, Philadelphia.

REPORT

OF THE

SPECIAL COMMITTEE ON MEDICAL EDUCATION.

BY

JAMES R. WOOD, M.D.

REPORT OF THE SPECIAL COMMITTEE ON MEDICAL EDUCATION.

AMONG the leading objects of the American Medical Association, since its organization, has been the elevation of the standard of medical education. Every member of this body, fully impressed with the greatness and dignity of his calling, has deplored the inferior qualifications of vast numbers of those who annually enter the ranks of the profession, and has naturally sought to remedy the evil.

In his individual capacity, or through the medium of local societies, he could accomplish little towards a general reform, and therefore, to this body, representing all the various interests of the entire profession of this country, he looked, as the proper medium through which to effect so desirable a change.

In furtherance of this object a Standing Committee on Medical Education was early established, to whom all matters pertaining to this subject might be referred, and brought forward for the consideration of this body.

This Committee has presented numerous and elaborate reports, not only examining critically our system of medical education, and showing its defects and needed improvements, but reviewing the educational systems of foreign countries, and presenting them in contrast with our own. In this manner the whole system of medical education has been so thoroughly analyzed, and so completely presented to this body, in all its details, that an extended examination of the subject by any subsequent committee would seem but a work of supererogation.

Adopting the suggestions of its Standing Committee, the Association has, from time to time, recommended certain improvements in our system of medical education, and urged upon the schools these desired reforms. Thus far, little has been accomplished but

discussion and agitation. The schools have been indisposed to adopt the proposed changes in their curriculum of studies, and this Association has lacked the power to render obligatory its proposed reforms.

At the last meeting of the Association, at Nashville, the subject of medical education was again introduced in a series of resolutions, denying that this Association has the power to control the subject of medical education, and deprecating any further agitation of it in this body. A substitute for these resolutions was offered and adopted, recommending the appointment of a Special Committee "to devise a system of medical education to be presented for the consideration of the Association, at its annual session in 1858."

Before proceeding to consider the several propositions submitted to your Committee, we beg to premise a remark in regard to the character of the Association, and its power to control the subject of medical education.

The Association may justly be denominated a representative body, the constituency of which, exclusive of the Army and Navy, is as follows:—

1st. The Lay Profession, represented through its State, County and Voluntary Societies.

2d. The Medical Schools.

3d. The Hospitals.

On the floor of this National Medical Congress the delegates of these great interests annually meet, and mutually consult over the affairs of the profession, and adopt such measures as will best promote its welfare. They have but one object in view, and that is neither selfish nor mercenary, viz: the elevation of the character and dignity of the profession, and the advancement of the medical sciences. Separate though these interests are, in many respects, yet so reciprocal are their relations, that harmony of views and concert of action must always result from their deliberations.

The profession at large depends upon the schools for well-trained and thoroughly educated graduates, who shall return to its ranks, and give it character and true dignity. The schools, in turn, depend upon the lay profession for the selection of students who are qualified by natural capacity, primary education, and moral fitness to receive the instructions which they give, and improve the advantages they offer.

The third interest, or the hospitals, occupies, at present, a position in this body far inferior to its just deserts. Containing within

themselves the elements, by which alone a medical education can be made complete, and the theoretical student can be made practical and competent to discharge his responsible duties, this interest must, at no distant day, be recognized as indispensable in its relations to any complete system of medical education.

Thus constituted of delegates representing, on a liberal scale, every interest of the profession, our great National Congress exercises an influence, and wields a power, that has all the force and energy of a government. It derives its just powers from the consent of the governed, and rests its claim of authority on the equitable principle that, in representative bodies, the majority must rule. It cannot be considered a merely advisory body, therefore, but must, of necessity, be ranked as a voluntary association of several great interests, reciprocally dependent upon each other, but aiming at the accomplishment of a purpose in which all are alike interested, and thereby exercising by its moral force, a compulsory power. The secession of either of these interests from a representation in this body, would, from its necessary relations to the two remaining, prove fatal to its prosperity, if not to its existence.

These three great interests of the medical profession, represented in this our National Medical Congress, should make common cause in the elevation of the standard of medical education. It is a subject that alike interests them all. The lay members of the profession should cordially support the schools in their efforts to improve their system of instruction. Standing, as they do, sentinels to the domain of medicine, they ought to guard it with a jealous and vigilant eye, that no unworthy laborer enter in. The schools should receive the high trust of educational training committed to their care, with due regard to its importance, and endeavor, by every means in their power, to return to the ranks of the profession men in every respect well appointed for the responsibilities of practical life.

They should also foster the hospitals of our cities as the proper complement of their own otherwise imperfect organizations. The hospitals, in turn, should adopt a thorough and complete system of clinical instruction, and afford to students every needed facility.

Thus united, and thus laboring to the accomplishment of one great purpose, with generous rivalry, the three branches of the profession here represented, may adopt and perfect a system of medical education which shall do honor to the profession and the country.

The duty of this committee, as set forth in these resolutions, is to devise a system of medical instruction, and to this end it is directed to consider—

1st. Primary medical schools;

2d. The number of professorships in medical colleges;

3d. The length and number of terms during the year;

4th. The requisite qualifications for graduation;

5th. Such other subjects of a general character as to give uniformity to our medical systems.

PRIMARY MEDICAL SCHOOLS.

It may be said, in a general way, that it matters little how the student obtains his knowledge, provided only such knowledge be obtained; and though the disparity existing among students in their acquirements depends very much upon the individual capacity to acquire knowledge, yet it is evident that much of this difference must depend upon the advantages which are afforded for study and improvement.

Medicine is eminently a science of observation and demonstration. The law or theological student may shut himself up in the library, and obtain a practical knowledge of his profession, for much of his study must be theoretical or speculative. But it is not so with medicine. Every branch of it is susceptible of demonstration and illustration. The student who most actively employs his senses will make the most rapid progress in the prosecution of its study. From the very commencement of his course, the successful student will begin to practise thorough and discriminating observation, nor will he cease to learn, by observation, while he remains a student, or a practitioner of medicine.

We deem it of the first importance, therefore, to the successful prosecution of the study of medicine, that the student be provided with something more than mere books and office recitations, though these are all proper in their places. He should not gain his knowledge of Anatomy, of Chemistry, of Physiology, of Medicine and Midwifery from books, secluded in a practitioner's office. His knowledge thus obtained would avail him as little, when put to the test of practical application, as would that of the mechanic obtained under similar circumstances.

Whoever affords to the student such advantages for the prosecu-

tion of his studies as we have indicated, whether as a single individual or associated with others, deserves all praise and encouragement. He does the profession at large a great service, and reciprocally receives his reward. On the contrary, we hold that those practitioners who, from their situation, can afford students no other aid than books, or, from their engrossment in business, cannot give them regular demonstrations and recitations on the branches pursued, are culpable; they receive students into their offices. They not only do the student a great injustice in thus allowing him to waste his time that he might otherwise improve, but they do much to lower the grade of medical education by adding to the number of imperfectly educated persons who are annually admitted to the profession.

Primary medical schools in our large cities should be encouraged as private enterprises of a praiseworthy character. But it is needless to expect that such schools, however favorably situated for teaching, will receive general patronage.

Office instruction has been and will continue to be the means by which the mass of students will seek to obtain their primary medical education. While, therefore, we would encourage all efforts to systematize primary medical instruction by the association of medical men, we would urge upon all who receive students into their offices as private pupils, either to give them personal attention by daily recitations, and actual demonstrations, or refer them to such school, or to some teacher who will give them proper advantages.

THE NUMBER OF PROFESSORSHIPS IN MEDICAL COLLEGES.

The great advancement of the medical science during the last few years, has materially changed the character of the curriculum of medical studies. The more common branches, as Anatomy, Chemistry, Practical Medicine, Surgery, Obstetrics and Materia Medica, have been indefinitely enlarged, and now require for their complete elucidation far more time and more patient and painstaking demonstration. But, in addition to the vast improvements in these departments, and their consequent expansion, other fields in the domain of medical science have been opened for investigation, and earnest, thoughtful laborers have cultivated them not in vain.

Physiology, Pathology and Microscopy, have thus been brought to a degree of perfection, that entitles them to a not unimportant place in a course of medical instruction. The medical student of to-day would be sadly deficient in his education, did he not familiarize himself with these latter branches.

To afford the student facilities, therefore, for obtaining a complete and thorough medical education, our schools must increase the number of their professorships, in proportion as each new department of medicine attains the rank of a definite science.

Physiology, Pathology and Microscopy, demand this consideration to-day; they are so generally recognized as essential to a complete medical education, that the graduate aspiring to excellence in his profession, would scorn the imputation of ignorance of them.

We take pleasure in recording the fact that some of our colleges have, with enlightened spirit and laudable zeal, provided for instruction in these several branches, and we can but conclude that such schools as do not keep pace in their teaching, with the progress of scientific discoveries, are doing great injustice to their pupils, and tending powerfully to depress the standard of medical education.

THE LENGTH AND NUMBER OF TERMS DURING THE YEAR.

The reason just assigned for increasing the number of professorships in our colleges may here be adduced in favor of lengthening the annual sessions.

We believe it quite impossible for the lecturer, on any given branch, to do justice to himself within the short period allowed him by the present system; and if the lecturer must fail of properly illustrating and demonstrating his subject for want of time, how far short of properly understanding such subjects must the pupil come, who has, in the same space of time, to study five or six other branches, all of which are obscure, and must be made the subjects of deep thought for their proper comprehension?

Every teacher of medicine must be impressed with the importance of giving to both teacher and pupil more time, not only by lengthening the terms of our colleges, but also by having fewer lectures daily.

The system, as at present pursued, is literally one of "cramming," and must sooner or later be essentially modified. Still more ob-

jectionable is the plan of some schools of having two courses in the year, or a fall and spring course. The effect of such schools upon our medical educational system is most disastrous. They serve as loop-holes by which too many gain access to the ranks of the profession, whom other schools have very properly rejected. Nor can we see any good reason why any school should have more than one annual course of lectures.

The assertion that many students are prepared to complete their studies in the fall, who were not in the spring, by their not having attended two courses of lectures, is no valid reason. Such inordinate haste to complete a course of study is inexcusable in the pupil, and reprehensible in the teacher who encourages it.

THE REQUISITE QUALIFICATIONS FOR GRADUATION.

The standard of general qualifications for graduation, which the colleges have adopted, is nearly uniform. They require that the candidate shall be 21 years of age, of good moral character, and studied medicine three years under the direction of a regular physician, and that he shall have attended two full course of lectures, the last of which shall be in the college from which he graduates. As to the requirement of specific qualifications, or actual knowledge of his studies, each school has its own standard, and this, it is humiliating to acknowledge, is too often most inferior. Every person who has been so situated as to have occasion to examine recent graduates, who have become candidates for places in our hospitals, or for other medical appointments, must himself have blushed at the ignorance which is frequently exhibited.

The question is often asked, is there no remedy for this evil? Can no way be devised by which the candidate for graduation shall be compelled to attain to a given specific qualification, or fail of receiving his diploma from any school in the country? We fear not. We have appealed to the schools to make the test of fitness for graduation, stringent but liberal, yet we appeal in vain. Governed by the false and pernicious idea that the prosperity of a school is measured by the number of graduates, a rivalry exists among our schools, unworthy of their character, and detrimental to the best interests of a sound medical education.

We know of no way to completely remedy this radical defect in our present system, but by the removal of the diploma-granting

power from the schools, and placing it in the hands of an Examining Board, the members of which shall have no college appointments.

In addition to the present requirements of our schools, there is one which the time has come for the profession to demand. We allude to attendance upon a clinical course in a hospital.

Clinical instruction must be considered the great desideratum in any system of medical education. It affords the only means by which the student can safely apply the knowledge which he has obtained from the schools to the practical realities of his professional life. At the bedside, and under the immediate instructions of his clinical preceptor, he systematizes his knowledge, and familiarizes himself with all the details of practice.

In any of our hospitals the student may obtain in a single course a personal experience in the diagnosis and treatment of diseases, which otherwise it might require him years to acquire. He there meets, at a single visit, every form of any given disease, in every stage of its progress, and may put to the severest test his knowledge of the science of diagnosis. There also he may watch the daily changes which disease effects, and accurately determine the value of remedies. It is in our hospitals only that he can properly study Pathological Anatomy, a science which forms the basis of all true knowledge of disease.

From our hospitals alone can men go forth to the responsible and perplexing duties of the medical profession, thoroughly prepared, from the first, to meet the most trying exigencies. If all our recent graduates were thus trained for active service, all thus men of experience and discretion when first they entered upon practice, how vast would be the advantages which would accrue to the character and position of our profession?

Nor are students unmindful of the advantages of clinical instruction. Within our own observation, hospitals situated in the vicinity of schools, and offering clinical advantages, are constantly attended by students, and oftentimes at the expense of their regular college lecture. We may refer, not invidiously, to the fact that Bellevue Hospital, of New York, which has an annual course of clinical lectures, has frequently in attendance a class of 300 to 400 students.

If such is the importance of clinical instruction, and such is its recognized necessity, even by the student himself, the hospitals should be immediately acknowledged by the schools as embracing a part of their curriculum of study, and it should be required by

the candidate for graduation that he have attended a course of clinical instruction.

But it may be asserted that the schools have supplied this deficiency in their system of instruction by establishing college cliniques. To this position we utterly dissent. The schools have thus, it is true, acknowledged the importance of clinical instruction, but they have in no proper sense supplied the want. College cliniques are not favorably regarded by the profession of any city where they exist. They gather in a class of patients who are frequently under the charge of junior practitioners, and after serving the purpose of the professor, and perhaps paying a fee to some *attaché* of the school, again return to their former attendant. Or they belong to the class of indigent poor, who, after a course of medical or surgical treatment, while living under the most unfavorable circumstances for health, are finally compelled to seek the comforts of a hospital.

And what does this avail the student? He sits remotely from the patient, and gathers but little more information than he would were the professor to read the case from a book, while the subsequent history of the case is entirely lost sight of.

We regard college cliniques, therefore, as in no respect supplying the student with clinical instruction, while they are detrimental to the poor where they are established, and injurious to young practitioners.

SUCH OTHER SUBJECTS OF GENERAL CHARACTER AS TO GIVE UNIFORMITY TO OUR MEDICAL SYSTEM.

To give uniformity to our medical system, concert of action, on the part of the Profession, the Schools and Hospitals, is evidently the *sine qua non*. And the question arises, how shall this be secured? The Profession demands the elevation of the standard of medical education, by the institution of a more thorough system of training than now exists, and a higher grade of qualifications for graduation. The Hospitals tender the varied and exhaustless materials at their command, and are prepared to give completeness and perfection to any system that may be adopted. With the Schools rests the decision of the question: Shall our system of medical education be revised or improved? Are they willing to yield the diploma-granting power to a Board of Examiners? Will they dispense with their college cliniques, and substitute a clinical course in a

well regulated hospital, and make the taking of a clinical ticket a requisite qualification for graduation?

We are far from being desirous of urging the schools to any hasty or inconsiderate action. On the contrary, we would counsel moderation, and careful consideration of every proposition of reform in our system of medical education.

We shall conclude this branch of our report by suggesting the propriety of a convention of delegates from the various schools of the country, all being equally represented, to take into consideration the various propositions for reforming our educational system, and to report at the next meeting of this Association.

Your Committee have thus briefly reviewed the several propositions submitted to their consideration, and beg to lay before the Association the following conclusions:—

First. Primary medical schools should be encouraged; but, as office instruction will continue to be sought by students, practitioners should either give them necessary advantages of demonstrations, illustrations, and recitations, or if not prepared to do so, they should refer them to such primary schools, or medical men, as will give them proper instruction.

Second. The number of Professorships should not be less than seven, viz: a Professor of Anatomy and Microscopy, Physiology and Pathology, Chemistry, Surgery, Practical Medicine, Obstetrics, and Materia Medica.

Third. There should be but one term annually, which should commence about the first of October, and close with the March following, thus lengthening the term to six months. The commencement of the term, in October, should be uniform in all the colleges throughout the country. During the session there should never be more than four lectures given daily.

Fourth. The qualifications for graduation, in addition to those now required by the schools, should be a liberal primary education, and attendance upon a course of clinical instruction in a regularly organized hospital.

In order to give our Medical Colleges an opportunity to consider the recommendations here advanced, and that this body may have the advantage of their wisdom and their mature views, before any definite action is taken upon them, your Committee submit to the Association the following resolutions:—

Resolved, That the several Medical Colleges of the United States be requested to send delegates to a Convention, to be held at on the day of for the purpose of devising a uniform system of medical education.

Resolved, That the present Report of the Special Committee on Medical Education be referred to such Convention for its consideration.

Resolved, That said Convention of Delegates, from the several Colleges of the United States, be requested to submit to the meeting of this Association, in May, 1859, the result of their deliberations.

REPORT

ON

SPONTANEOUS UMBILICAL HEMORRHAGE

OF THE

NEWLY-BORN.

BY

J. FOSTER JENKINS, M.D.,
YONKERS, N. Y.

REPORT ON SPONTANEOUS UMBILICAL HEMORRHAGE OF THE NEWLY-BORN.

To the physician, whose attention has not been attracted to this malady by some example of its more formidable variety, it may seem a needless task to search for past records of it, or to discuss at length its phenomena. In its least important form, the one most amenable to treatment, viz: bleeding from a fungoid growth supervening on the separation of the funis, it is not unfrequently seen, while the graver and almost intractable form of spontaneous umbilical hemorrhage is fortunately rare.

A careful review, then, of such facts as are recorded concerning this malady, may contribute in some instances to render prognosis more guarded, and treatment more prompt, I should hope also more successful.

I do not propose to refer in this report to instances of bleeding from the cord, the result of its careless ligation, nor to cases of traumatic hemorrhage from the umbilicus, as, *e. g.*, the oft-quoted case of Mr. Hill,[1] where the bleeding was the result of the forcible avulsion of the cord, but shall consider only those hemorrhages which, independent of accident, probably owe their existence, for the most part, to constitutional causes.

Spontaneous umbilical hemorrhage of the newly-born exists principally under two forms.

I. The form most frequently seen proceeds from a fungoid excrescence which occasionally springs up from the bottom or edge of the navel, after the falling of the cord, while cicatrization is yet incomplete. From its granulated surface, moderate bleeding occurs at intervals. While recent, it in general requires only application of the nitrate of silver crayon, to cause it to shrink and speedily

[1] Dublin Medical Press, June 7th, 1848, vol. lii. p. 556.

cicatrize. But if neglected, the granular, somewhat indurated, tubercle which exists, is best addressed by the ligature. I have not found any instance, in which this form of hemorrhage uncomplicated,[1] has proved fatal, though Underwoood[2] speaks of having known it to continue for several months, and to cause apprehension as to its effects upon the health of the child.[3]

II. But there is another form of bleeding from the umbilicus to which new-born children are liable, which may not be thus briefly dismissed. Its fatality, and the want of attention bestowed upon it by systematic writers on the diseases of children, lend encouragement to any effort to make its history more widely known, or to indicate more definitely its proper treatment.

Existing so seldom, that often the obstetric practitioner of a quarter of a century has never seen an instance of it,[4] its extreme fatality is the less likely to be recalled when the exigencies of a first case demand prompt and energetic treatment.

It occurs alike in the well-developed children of healthy parents, and in the puny heirs to cachectic constitutions. Commencing occasionally, a few hours after birth, by exudation of pale blood from the walls, and at the insertion of the funis, it more frequently succeeds, sometimes by many days, to the falling of the cord. Jaundice and purpuric eruption from their frequent association with it, may perhaps be regarded as warning signs of its coming. Other than these it has none. A serous or sanious oozing from the apparently healed surface of the umbilicus deepens gradually into a continuous percolating hemorrhage. Compression, astringents, styptics, cauterization, actual and potential, are generally alike useless in staying its flow. Even though arrested, it may be followed by effusion of blood into the cellular tissue beneath the skin, and from the mucous membranes. It ends in a majority of

[1] Dr. D. McRuer, of Bangor, Me., has communicated a case of fatal hemorrhage from the navel (No. 174 of Table), in which a fungoid growth, which supervened at the fourth week, on a previous hemorrhage, continued to bleed for two months, at intervals of from four to eight days.

[2] Diseases of Children, vol. ii. p. 89. London, 1789.

[3] See also Mr. Sterry, London Med. Gaz., vol. xliii. p. 428; Drs. Greene and Page, Boston Med. and Surg. Journ., vol. lviii. p. 22, Feb'y 4th, 1858; Simpson, J. Y., Obstetric Works, second series, p. 423. American edition.

[4] Dr. Charles Hooker, of New Haven, Conn., who has observed 2,879 births, and Dr. Elisha P. Fearing, of Nantucket, Mass., whose experience embraces over 4,000, have each in their own practice witnessed but a single case. The late Dr. F. U. Johnson, of N. Y., had, in 1853, never seen a case.

instances, before the termination of the third day, in death from exhaustion.

To a more minute history and review of the class of hemorrhages, of which the above may be considered a general description, and to the discussion of questions thence arising, the remainder of this report will be devoted.

It is due doubtless to the rarity[1] of this malady that, up to 1850, it had been almost entirely ignored by systematic writers on the diseases of children. I have examined, I believe, nearly every work of any note on children's diseases, published in French or English, since the time of Underwood, and until 1850 only Underwood, Capuron, and Cheyne, more than merely allude to it,[2] while the first two of these writers do not seem to recognize its grave character. Writers on midwifery also usually treat it alike lightly. But, though not garnered in any storehouse of learning, facts, singly and in groups, are scattered here and there through the fields of medical literature, and to those interested in pædiatrics it may be of service for one to bind them into sheaves.

In English, French, German, and American journals, from 1752 to 1857, I find the records more or less complete of 80 cases. Dr. Francis Minot, of Boston, Mass., has kindly allowed me an examination of the table of cases, on analysis of which his almost exhaustive article on Hemorrhage from the Umbilicus in New-born Infants was based. From this source I derive 21 new cases. I have received, through the courtesy of medical gentlemen, in localities widely separated, statements concerning 76 additional cases, and one case has occurred under my own observation. These 178 cases I have submitted to careful comparison and analysis, and though conclusions based upon this number are not perhaps unas-

[1] At the Foundling Hospital at Paris, but a single case occurred in between 9,000 and 10,000 children admitted in two years, preceding Jan'y, 1853. Dr. Stephen Smith states (*New York Journal of Medicine*, July, 1855, p. 74) that, "in the Dublin Lying-in Hospital, no cases are reported in a period of twelve years, during which there were 6,654 births." Dr. Henry G. Cox informs me that in about 2,000 births at the Emigrants' Refuge, Ward's Island, N. Y., two instances of this hemorrhage existed.

[2] In writing the above statement, the description by Dr. D. F. Condie (*Treatise on the Diseases of Children*, 2d edition, Phila. 1847), of both forms of umbilical bleeding here considered, was strangely overlooked. From personal experience mainly, Dr. C. seemed to consider them among the most troublesome accidents occurring in young infants, that the practitioner is called upon to treat. A subsequent edition of the treatise contains an extended article on umbilical hemorrhage.

sailable, they will not be shaken, I think, in some important points by even a more complete array of facts.

I now propose to present first an account of what has been already published on the malady under discussion; then to record cases hitherto unreported, arranging the whole in tabular form, and finally to submit the conclusions educed by an analysis of all the facts.

The earliest record of hemorrhage from the umbilicus which I have been able to find, was made in 1752, by G. Watts, a practitioner of Hawkhurst, Kent, England, in the pages of the *Gentleman's Magazine*,[1] which, by its reception of medical contributions, partially supplied in England the place of a medical periodical. The words in which this case is narrated are descriptive with sufficient accuracy of many a case since. "Some time ago, an infant in this place, whose *funis umbilicalis* came off in the ordinary way on the 7th day after birth, was seized on the 4th day following with an hemorrhage from the umbilicus, which, notwithstanding the application of various styptics, with compress and bandage on the part, continued to recur by intervals in so violent a manner, that the poor babe expired within six and thirty hours from the beginning of its bleeding." The hemorrhage was supposed to be venous, "for the blood drilled in a uniform equable stream down the belly."

The writer stated that the same accident had been noticed several times within a few years, and solicited the opinions of others regarding it. I have been able to find but a single expression of opinion in reply. M. Sue, in his curious *olla podrida* of obstetrical lore,[2] published 27 years later, says: "For our part, we think that this accident will especially occur when the cord is not tied, or when it is tied too loosely, or too near the umbilicus. One may easily perceive the reason of it." Such criticism shows us that its author was not less ignorant in this matter than the object of his ridicule.

In 1786, Underwood published the first systematic treatise in the English language on the diseases of children. He speaks of this form of hemorrhage as attendant upon infants who are in a bad state of health during the month, but betrays an unappreciative knowledge of the malady in his remarks concerning its treatment.

[1] Gentleman's Magazine, London, April, 1752, p. 172.

[2] Essais, Historiques, Littéraires, et Critiques sur l'Art des Accouchements, ou Recherches sur, etc., par M. Sue, le jeune, etc. etc. Paris, 1779, p. 569.

"It requires, however," says he, "nothing more than the application of common styptics, with proper compress and bandage. The bleeding not appearing in the least to be critical, ought to be suppressed as soon as may be."[1]

Cheyne, in his essays published at Edinburgh[2] at the beginning of this century, describes a fatal species of jaundice which attacks infants a few days after birth. He attributes its fatality to "an original and incurable malconformation in the liver," which "malconformation is probably an impermeable thickening of the beginnings of the hepatic duct, or, as they are called, the *Pori Biliarii*."

As illustrative of this form of jaundice, he cites a case of a female child, remarkably stout and healthy at birth, but who became jaundiced on the third day. The cord fell off on the sixth day. The jaundice continuing, there was slight hemorrhage from the umbilicus on the 16th day, and on the 18th day a profuse hemorrhage, in consequence of which the child died. The autopsy showed that "the liver was full and firm, and of a dark green earthy color. The gall-bladder was quite empty and contracted." "The ducts also were contracted, firm, white, and like an artery, and, although pervious, contained no bile. The opening into the gut was perfectly free to the probe. When the substance of the liver was cut into, this appearance of firmness of the ducts was still discernible." Grumous blood was traced from the centre of the navel along the arteries, which, as well as the vein, were open.

Although, as we proceed, we shall not find hepatic obstruction by any means a constant condition in umbilical hemorrhage, we shall notice many cases attended by jaundice, and shall probably believe with Cheyne, that in some of them "the bleeding proceeded from the unhealthy change produced in the blood by the reception of the bile into the mass of fluids."

In the *Medico-Chirurgical Transactions* for 1822, a case is recorded which was observed by Mr. Pout.[3] A fine healthy male child was attacked with hemorrhage from the umbilicus on the 8th day after birth, the cord having separated on the 6th day. The navel was plugged with lint, and a compress and adhesive plaster were applied over that. The hemorrhage, however, was not arrested, and the child died in 27 hours after its commencement. At the autopsy

[1] Diseases of Children, London, 1789, vol. ii. p. 89.
[2] Essays on Diseases of Children, Edinburgh, 1801, Essay ii. p. 8.
[3] Medico-Chirurgical Transactions, vol. xii. p. 183. London, 1822.

the umbilical vein was found full of fluid blood, and nearly as large as a goose-quill. Both of the umbilical arteries were sufficiently large to admit a probe, and the left, from which it would seem the bleeding took place, contained a plug of coagulated blood. Both were so much retracted within the integuments that pressure would have been of little service in arresting the bleeding. Mr. Pout stated that in a similar case he should cut down upon the arteries and tie them. The mother of this child had previously lost two children under precisely similar circumstances, and had three fine children living.

Hufeland's Journal[1] of Feb'y, 1824, contains the record of a case of umbilical hemorrhage, reported by Dr. Elssaesser, of Stuttgard, occurring in a family of marked hemorrhagic predisposition. In this instance the child, which seemed healthy at birth, sickened on the 8th day, "and on the 14th day was attacked by a spontaneous hemorrhage from the navel (which some days before was apparently healed), that continued for 48 hours without intermission, when the child died."

Mr. Radford, in the *Edinburgh Medical and Surgical Journal* for July, 1832 (p. 1), communicates an article on hemorrhage from the umbilicus, with details of two new cases, referring, however, to several others which had occurred under his observation. In one case noted, compression failed to arrest the bleeding, and "after death the vein was found uncontracted." In the other case, there was a spontaneous cessation of the bleeding, within a few hours of its commencement, and a compress, supported by adhesive strips, being applied, no more hemorrhage occurred. Mr. Radford suspected the hemorrhage in this case to be arterial, and, in general, believes, that when the bleeding proceeds from the umbilical arteries, compression will usually check it, while bleeding from the umbilical vein, which he considers most common, is less amenable to treatment. He says (p. 4): "The opinion usually entertained as to the dangers arising from these two kinds of hemorrhage (as occurring in other parts of the body), is not true in the cases referred to in these observations. Venous hemorrhage from the umbilicus occurs frequently, and, in general, terminates fatally. Arterial hemorrhage, on the contrary, in this situation, is more rare and more fortunate in the result. I have already alluded to

[1] Journal der Practischen Heilkunde, Febr., 1824. London Med. Repository, new series, vol. iii. p. 506. Med. Review, Philadelphia, 1824, p. 279.

the insufficiency of compression to arrest bleeding from the umbilical vein. This is readily accounted for, when we consider the situation of the vessel, which is placed behind the flexible abdominal parietes, to which it is attached, there being nothing firm or resisting behind it, by the aid of which, a compress might effectually obliterate the calibre of the vessel." He recommends cutting down upon the vein and tying it as the only reliable treatment.

In the *Medico-Chirurgical Review* for July, 1834, is quoted, from *Journ. der Pract. Heilk.*, an instance of umbilical hemorrhage, chiefly interesting as an instance in which the hemorrhagic tendency was probably transmitted from the mother. The mother was of a delicate constitution, and *liable to profuse menorrhagia.* She was delivered of a boy March 29th. It seemed tolerably healthy, though fair or almost white. It suffered successively from jaundice, aphthæ, convulsions, and a diarrhœa, which proved fatal on the ninth day after birth. The navel string was constantly moist with a bloody serum, which kept oozing from its divided extremity, and resisted every styptic. When the tied portion fell off, pure blood trickled from the umbilicus, which was thus always covered with a coagulum. The scrotum in this infant had a dark purplish color. Three former children of this woman died on the 8th, 12th, and 14th days after birth, in consequence of bleeding from the navel.

Dr. Tiemann, of Bielefeld, reported,[1] in 1837, an instance in which umbilical hemorrhage was accompanied by jaundice and bleeding from the nose, mouth, and bowels.

In *Fricke und Oppenheim's Zeitschrift*, vol. v., 1841, Dr. Jecker reports a case of fatal hemorrhage, in consequence of non-obliteration of the umbilical artery. The cord fell off on the 7th day from birth. The hemorrhage commenced three days later. The *ferrum candens* was employed without benefit.

Dr. Churchill, in this year, in connection with the observation of Mr. Pout, alludes[2] to two fatal cases related to him by a friend, and recommends theoretically, in like cases, to fill the navel with fluid plaster of Paris, that it may "set," and so arrest the hemorrhagic flow.

Not far from this time, a case of fatal hemorrhage after separation of the cord on the ninth day, is reported in *Van Siebold's Journal* (10th Report, vol. ix.).

[1] Medicin Zeitschrift v. Vereine für Heilk., in pr., 1837, No. 42. American Med. Intelligencer, vol. iii. p. 44. Philadelphia, 1840.

[2] Operative Midwifery, p. 296. Dublin, 1841.

In the *Northern Journal of Medicine*[1] for August, 1844, Dr. A. B. Campbell, under the head "Icterus Gravis Infantum," relates three instances of fatal hemorrhage from the umbilicus, accompanied with jaundice. In two of them, occurring under his own observation, there was obstruction to the passage of bile into the duodenum. In one, "the gall-bladder was very small and collapsed, contained only a little mucus, and *formed a close sac, having no outlet, the excretory ducts leading from the gall-bladder and liver being absent.*" In the other case, "the gall-bladder contained a quantity of bile, which could not escape, *owing to an indurated plug of inspissated bile which occupied the ductus choledochus.*" In the third case there was no autopsy. In another case of icterus, related by Dr. Campbell, in the same paper, it is curious to observe that "there was no hemorrhage from the umbilicus, but jaundice came on the day after birth, and the abdomen was tumid from enlargement of the liver; the child lived to the age of six months; death then ensued, the liver having increased so as to fill the greater part of the abdomen. Upon examination, *neither a gall-bladder nor bile-duct could be discovered.*

In 1845, Dr. Ulsamer published[2] at Berlin an article entitled "Experiences in Midwifery," resulting from observations during the course of ten years. In this retrospect he notes one case of hemorrhage, after the separation of the cord, treated, with only temporary benefit, by the solid nitrate of silver, by styptic powders of kino and alum, and by filling the umbilical depression with soft wax. At the autopsy the umbilical vein was found patent.

During the last few years the record of observations has become more full. In 1847, M. Jeunin, of Voray, France, reported a case[3] where a "considerable hemorrhage," which had existed for three hours, and had been addressed by *argent. nit.* and the *fer rouge* unsuccessfully, was arrested by the ligature *en masse.*

Dr. Olliffe, on March 24th, of this year, read to the Parisian Medical Society a report of a case[4] accompanied by jaundice, in

[1] Northern Journal of Medicine, vol. i. p. 237. Edinburgh, 1844. Not having access to this journal, I rely on Mr. Manley's excellent paper in the London Medical Gazette, vol. xlv. p. 759. London, 1850.

[2] Neue Zeitschrift für Geburtskunde, vol. xvii. p. 271, 1845.

[3] Revue Médicale, Sept., 1847, p. 87.

[4] London Medical Times, April 3, 1847, vol. xvi. p. 116. This case attended and first reported by Dr. Olliffe, is often quoted, as communicated by M. Paul Dubois, who saw the child in consultation with Dr. O.

which the ligature *en masse*, advised by M. Dubois, arrested the bleeding from the umbilicus, but the child continued feeble, and died afterwards from intestinal hemorrhage. Examination, *post-mortem*, showed the liver to be large, its color natural; gall-bladder small and empty; the hepatic vessels healthy.

In this year, also, Dr. Simpson read to the Obstetrical Society of Edinburgh,[1] a report of two fatal cases which occurred in India. The subjects were children of the same parents. In both there was a degree of jaundice. Treatment by pressure and styptics was of no avail, and both died on the 11th day from birth. Dr. Keiller also stated to the same society[2] a case in which the bleeding proceeded from the root of the funis, before its separation. Though the hemorrhage was arrested by a ligature, the child died a few minutes afterwards.

During 1848 there occurred in this country the two fatal cases of Dr. Marsh,[3] of Patterson, N. J., and the case of Dr. Cock,[4] the latter accompanied by icterus and ecchymotic spots. In France, M. Thore reported a case[5] associated with purpura. The hemorrhage was controlled by nitrate of silver, but the child died at the end of 20 days, with purpura and muguet. M. Thore cites also a case published by M. Villeneuve. M. Emile Dubois, in an excellent inaugural thesis[6] on umbilical hemorrhage, in addition to the cases of Mr. Pout, MM. Jeunin and Thore, and Dr. Olliffe (attributed to M. Paul Dubois), already mentioned, furnishes an hitherto unpublished observation occurring under his own notice. In this case the hemorrhage was arrested by the ligature, as recommended by Professor Dubois, but the child died 12 days after of enteritis. The umbilical vein and the *ductus venosus* were contracted, but not impermeable. The umbilical arteries seemed like whitish cords, with a narrow canal and thick walls. They were friable, and each contained a filiform and adherent clot. There was no trace of peritonitis.

Early in 1849 Mr. Edward Ray read before the South London Medical Society,[7] a paper, one object of which was to demonstrate

[1] Monthly Journal of the Medical Sciences, July, 1847. Edinburgh.

[2] Ranking's Abstract, No. 6, p. 270.

[3] New Jersey Medical and Surgical Reporter, vol. i., 1848.

[4] New York Annalist, vol. ii. p. 189.

[5] Gazette Médicale de Paris, Mars 11, 1848.

[6] De l'hémorrhagie ombilicale après la chute du cordon. Theses de Paris, 1848, No. 241. Archives Générales, Oct., 1849, p. 188.

[7] London Medical Gazette, vol. xliii. p. 423, March 9th, 1849.

that the male sex is especially liable to this form of hemorrhage; and to establish the fact of its frequency in a succession of *male* infants of the same family. Mr. Ray, in addition to the cases of Messrs. Pout, Radford, and Keiller, adduces three new cases, in children whose mother he had attended in her sixth confinement. The three male children of this lady all died with hemorrhage from the navel, accompanied by jaundice, the last being also purpuric, while three female children were not thus attacked. The general truth of Mr. Ray's proposition is now established, though exceptional cases are by no means rare, as *e. g.*, those mentioned by Drs. Bowditch and Anderson, to be immediately referred to.

In July of this year Dr. John Homans, of Boston, Mass., published[1] seven cases of umbilical hemorrhage. Immediately before their publication Dr. H. J. Bowditch read to the Boston Society for Observation in Medicine and the Collateral Sciences, a paper[2] detailing fully two cases which had occurred in his own practice, and analyzing ten others gathered from practitioners in Boston. Seven of the ten, however, were the same cases as those above referred to, published a few days afterward by Dr. Homans. The two children who were the subjects of original observation, as detailed by Dr. Bowditch, were a daughter and son, the first and fourth children of the same lady. Her second and third children were boys, and were not attacked by hemorrhage. Dr. Bowditch gives the following *résumé* of facts regarding his cases. "In these cases both children died of hemorrhage from the navel (on the twentieth and fourteenth days after birth). They were of both sexes, while males, according to authors upon the hemorrhagic tendency, are more liable than females. In both cases the cord came off quite well, and without external injury; one on the third, the other on the fifth day before the hemorrhage commenced. In both the parts seemed entirely cured, and presented no discharge for several days before the fatal oozing took place. In both all local applications seemed, in a very short time, to excite rather than to check the disease. In both very violent surgical operations were resorted to, without the least benefit. Death took place in one on the third, in the other on the sixth day after the attack. One had white dejections from birth, both had purpuric extravasations and bloody dejections at last. At the autopsy of one, disease of liver and non-coagulated blood were

[1] Boston Medical and Surgical Journal, vol. xl. p. 449, July 11th, 1849.
[2] American Journal of the Medical Sciences, Jan'y, 1850, p. 63.

found; no opening or apparent disease about the navel, or vessels leading thereto, was found." The surgical operations referred to were, in the one case, the ligature *en masse*, in the other, the actual cautery.

Before the close of the year, Dr. W. C. Anderson, of Staten Island, N. Y., communicated to the *Boston Medical and Surgical Journal*,[1] a report of two cases which seem to have suggested to the writer's mind the belief, which wider observation has since established as an accepted medical doctrine, that there exists an intimate connection between the reabsorption of the constituents of the bile into the circulation, or their non-elimination from the blood, and the hemorrhagic tendency. I do not find that hemorrhage, as a *result* of icterus, had been before noticed, though their association in disease was known to be frequent. Dr. Bowditch, in his paper heretofore referred to, and published simultaneously with Dr. Anderson's communication, seems to have been led by a consideration of Dr. Campbell's cases, with his own, and instances of hemorrhage in adults suffering from disease of liver, to almost the same opinion, though he enunciates it only by implication.[2]

Dr. Anderson reports of the first case, which was seen by him, that a female child died on the 12th day from birth, after an hemorrhage from the navel of 28 hours, accompanied by severe jaundice and purpuric spots. The autopsy showed the liver large and reddish-brown. The gall-bladder was distended with greenish-yellow bile. The hepatic and cystic ducts just beyond their junction terminated in a *cul-de-sac*, the place of the common duct being occupied by impervious tissue. The tissues were all deeply tinged with bile. The mucous membrane of the stomach was ecchymosed. The fœtal openings were all obliterated, except the umbilical vein, from which the bleeding had proceeded. In view of the greater liability of jaundiced persons to suffer hemorrhagic discharges, it is noteworthy that the mother of this child had previously a daughter who, at the age of four months, was affected with jaundice complicated by purpura, which terminated favorably.

[1] Boston Medical and Surgical Journal, vol. xli. p. 440, Jan'y 2d, 1850.

[2] It is somewhat remarkable to notice that, though in France, during this same year, M. Monneret published a memoir calling attention to hemorrhages of hepatic origin (*Archives Générales de Médecine*, June, 1854, p. 643), yet neither there, nor in an essay published in 1854 on hemorrhages produced by diseases of the liver, does he make, on this point, a more definite statement than that "it is difficult to explain the development of hemorrhages which proceed from the diseased liver, otherwise than by alteration of the blood." (*Loco cit.*, p. 655.)

The other case, related by Dr. Anderson, occurred, as did the first, in the practice of Dr. S. R. Smith, and presented the same features. Death occurred on the 8th day, from hemorrhage, preceded by jaundice and purpuric spots. There was no autopsy. In this case too the mother had previously a daughter who died with jaundice and purpura on the 5th day, but without hemorrhage. In the two instances just noted, of exemption in females from external hemorrhage, did the influence of sex intervene? The existence of purpuric eruption in both cases, shows that it did not prevent the change in the blood, on which hemorrhage probably most frequently depends.

In 1850 Dr. John Manly read before the Abernethian Society of London, a very interesting paper on hemorrhage from the umbilicus after the falling of the cord,[1] in which he recapitulated twelve cases of Ray, Campbell, Bowditch, Thore, Dubois, and Olliffe, to which he added a case recently observed by himself. In this case the hemorrhage, which commenced about the 12th day after birth, and was accompanied by jaundice, resisted the employment of pressure, styptics, and the actual cautery, and resulted in death on the fourth day.

An instance of hemorrhage from the umbilicus, preceded by bleeding from the scrotum, and followed by bleeding from the mouth, tongue, gums, stomach, and bowels, the skin also becoming ecchymotic on slight pressure, was also reported this year by Dr. Amyot, in the *London Medical Times.*[2]

For nearly two years no records of this malady appear, but in 1852, just a century after the simply stated case of Watts, Dr. Francis Minot, of Boston, read before the Boston Society for Medical Improvement, an essay on Hemorrhage from the Umbilicus in New-born Infants,[3] based on an analysis of 46 cases. This essay, from the thoroughness of its analysis of the facts possessed by the writer, and its careful rejection of improper cases, is peculiarly valuable. It is to be regretted that Dr. Minot did not attach to his paper, as it was given to the profession, the carefully tabulated array of facts, on which it was based. A malady, as yet but indistinctly recognized, has need of all facts which may elucidate its history. Dr. Minot believes "that idiopathic hemorrhage from the

[1] London Medical Gazette, vol. xlv. p. 755 (May, 1850).

[2] Vol. xxi. p. 449, June, 1850.

[3] American Journal of the Medical Sciences, vol. xxiv. p. 310, Oct., 1852.

umbilicus in young infants, is only one of the various manifestations of the hemorrhagic diathesis, which, in other cases, is exhibited in bleeding from the gums, mouth, stomach, intestines, &c., and in the appearance of purpuric spots, beneath the skin in various parts of the body." In proof of this, he cites "the concurrence of these phenomena with umbilical hemorrhage. * * * * Another argument is the thin and watery condition of the blood, and its great deficiency in fibrin, whereby mechanical means become almost wholly inefficacious to arrest its flow" (p. 314). He fully recognizes and makes prominent its dependence on a constitutional cachexy.

During this year, Dr. W. C. Bailey, of Spencertown, N. Y., added to the published records of this malady, the history of three fatal cases seen by him.[1] In two, the children, a boy and a girl, had the same mother. Another boy and girl, of the same mother, had escaped. Both of the children attacked "died from prostration induced by hemorrhage, both had bloody dejections from the bowels, and one from the urinary passage. In both there was more or less extravasation of blood under the cuticle; in one it escaped from the mouth." Both had, at the commencement, clay-colored stools, and one jaundice and purpura. In the latter the bleeding was temporarily arrested by the ligature *en masse*, but recurred seven days after the separation of the needles, and proved fatal on the 22d day from its commencement. The other case, reported by Dr. Bailey, is chiefly remarkable for the spontaneous cessation of the bleeding, as in one of Mr. Radford's cases. In this, however, death ensued in eight hours.

In 1853 M. Henri Roger, Physician to the Foundling Hospital at Paris, read before the Medical Society of the Parisian Hospitals, an excellent memoir[2] on hemorrhage from the umbilicus after the falling of the cord, founded mainly on the cases of Pout, Radford, Ray, More, Dubois, and Olliffe. The only cases mentioned in it, previously unpublished, were, one occurring under his observation at the Foundling Hospital, and, as before mentioned, the only case which had occurred at the institution for two years, out of more than 9000 new-born infants; and an instance of the accident in twins, communicated by M. Danyau. M. Roger considers the patency of the umbilical arteries, from which, contrary to the

[1] American Journal of the Medical Sciences, April, 1852, p. 432.

[2] L'Union Médicale, vol. vii. pp. 138—147. Paris, Mars 24, 26, 29, 1853.

opinion of Radford, he believes the bleeding generally to occur, to be due frequently to arteritis, as shown in some instances where the arteries were found after death to be dilated, friable, ulcerated, and uncontracted. Noting, too, that in the cases quoted by him, hemorrhage had commenced in no instance later than the 13th day after birth, he would establish the practical inference that, after the second week of existence, infants have an immunity against umbilical hemorrhage, another illustration of the danger of generalizing in medicine from a small number of facts.

In this year Mr. W. Gage communicated to the *Western Lancet*[1] an instance of this variety of hemorrhage, which, after resisting astringents and styptics for several days, was arrested permanently, by binding down with a bandage around the body, a lady's thimble, with its concavity towards the abdomen, the rim encircling the bleeding surface.

During this year also Dr. George A. Otis published a paper on "Hemorrhage from the Umbilicus in New-born Infants,"[2] embodying an excellent *résumé* of what had been given to the public, in French and English, since the time of Pout. His deductions are based on 49 cases, excluding those counted twice.[3] He adds too one case to the recorded list. It presents the features now so well known to us. Hemorrhage, on the 14th day from birth, accompanied by jaundice and purpura, with bloody stools, resisting, except temporarily, compression styptics and the argentine cautery, and, though yielding to the ligature *en masse*, leading to death 18 hours after, and 40 hours from the commencement of hemorrhage.

Two cases were reported in 1854. One by Mr. Willing, communicated to the *Medical Times and Gazette*,[4] London. Jaundice was present during the progress of the disease, and on examination after death, the liver was found to be of a darker color than natural, and much gorged with blood. The other case, which was complicated with congenital ichthyosis, was reported to the Boston Society for Medical Improvement, by Dr. A. A. Gould,[5] who, soon after, witnessed in a child of the same parents, a recurrence of this com-

[1] Sept., 1853, p. 552.

[2] Virginia Medical and Surgical Journal, vol. ii. p. 49. Richmond, 1853.

[3] The great difficulty of avoiding repetitions in statistical papers, seems to demand that in all such articles the cases should be tabulated with reference to date and authority.

[4] March, 1854, p. 287.

[5] American Journal of the Medical Sciences, vol. liv. p. 356, April, 1854.

plication, and subsequently published an account of both cases.[1] In the first case, beside the affection of the skin, it was noticed that the alvine discharges, though copious, were destitute of bile, the surface was jaundiced, with amber-colored urine, and the hemorrhage yielding but temporarily to astringents, compression, and the nitrate of silver, proved fatal on the third day from its commencement. An autopsy revealed the pervious state of all the umbilical vessels. The liver was very dark-colored, friable, gorged with blood; the gall-bladder flaccid, containing a little clear fluid, and the cystic and common ducts were impervious. The second child presented the same general features. The first discharge from the bowels was dark, like ordinary meconium, but the dejections became at once straw-colored, and then quite white. Jaundice was present on the eighth day from birth, at which time the hemorrhage commenced, and little effort being made to control it, death ensued in two days. The examination, post-mortem, showed the umbilical vessels open, the liver congested, and of a bronze-green color, the gall-bladder partially filled with a gelatinous fluid, and the cystic and hepatic ducts apparently closed.

The mother of these two children lost her first child, which also had congenital ichthyosis. It died hydrocephalic on the 16th day from birth.

During the summer of 1855, Dr. Stephen Smith, of New York, communicated to the *New York Journal of Medicine and the Collateral Sciences*,[2] an article previously read before the Society of Statistical Medicine, entitled, "Remarks on Hemorrhage from the Umbilicus of Infants, with a table of 79 cases." Seventy-four of these cases are of the variety of hemorrhage now under consideration.[3] Dr. Smith has tabulated his cases in an admirable manner, for which the student of this subject will thank him all the more heartily from having noted the deficiencies, in this regard, of previous writers. I acknowledge my indebtedness to Dr. Smith's table for five cases.

During this year German medical literature was enriched by the publication at Leipsic of a monograph on the "Hemorrhagic Diathe-

[1] Boston Medical and Surgical Journal, vol. liii. p. 109, Sept. 6th, 1855.

[2] New Series, vol. xv. p. 73, July, 1855.

[3] Two (Nos. 72 and 76) are instances of traumatic hemorrhage. No. 51 is an example of hemorrhage from a fungoid excrescence, as described at the beginning of this report. I have excluded two other cases from my table (Nos. 18 and 25), through inability to verify the reference.

sis, or the Blood Disease," by Dr. Ludwig Grandidier.[1] His 13th chapter treated of the "Hemorrhagic Diathesis in the Newly-born, and Bleeding at the Navel." It is a fair exponent of modern knowledge as to the history, pathology, and treatment of this constitutional malady. Its statistical conclusions are, however, much impaired in value by the error so fatal to accuracy, of including the same cases more than once, in making up the summary from which deductions are drawn.

A few other isolated facts have since been observed, and to a German physician are we again indebted for an essay on idiopathic bleeding from the navel in new-born children.[2] Dr. Steinthal, of Berlin, has, in connection with his *résumé* of what had been previously published, added three observations noted by Dr. Lode and himself. He quotes from Dr. Minot's analysis, but does not apparently tabulate anew the phenomena of other cases.

Cases hitherto unpublished. CASE I.—I attended Mrs. L., æt. 26, in her first confinement, on the 13th of May, 1855. She was a healthy woman, and had a short and easy labor. The child, a boy, was rather small, and for 36 hours after birth, seemed to suffer from colicky pains. On the second day after birth, the child became jaundiced. The dejections were normal, containing bile; the urine was so deeply colored as to stain the napkins of a saffron hue. The conjunctivæ were injected. The cord fell off on the sixth day, and the congestion of the conjunctivæ had disappeared. On the morning of the seventh day the child vomited blood in small quantity. On the afternoon of the same day I was called to the child, whom I found bleeding from the umbilicus. The blood oozed steadily from the depression, but no point whence it issued from any considerable vessel could be determined. The application of cold diminished the flow, and a conoidal compress of raw cotton, saturated with a strong solution of alum, and pressed down into the umbilical depression by a bandage around the body, completely stopped it. The cessation, however, was but brief. Soon after my departure, having requested that I should be called in case of a return of the bleeding, the hemorrhage recurred, and the rude

[1] Die Hämophilie, oder die Bluterkrankheit. Leipzig, 1855.

[2] Ueber die idiopathische Nabelblutung neugeborener Kinder. Von Sanitätsrathe Dr. Steinthal, prakt. Arzte in Berlin. Journal für Kinderkrankheiten, Jan. u. Febr., 1857.

expedients, of the attendants, for checking it, accomplished nothing. No other professional aid was sought, and the child died on the morning of the 8th day from birth, 16 hours from the commencement of the hemorrhage. The body was of a bright saffron hue after death. No autopsy could be obtained.

For the following interesting record I am indebted to the courtesy of Dr. F. T. Burnstead, of N. Y., from whose note-book I derive

CASE II.—June 26th, 1855. Henry S., æt. 15 days.

History.—The mother of this infant is a stout, healthy-looking German woman, aged 37 years. A resident of this country two years. She reports that her health has been always good, and she has always been accustomed to hard work. This is her fourth child. The first two, boys, are still living. The third and last, previous to this, a girl, was born in Germany 2½ years ago, became jaundiced three days after birth, which symptom disappeared in time, but the child died at the age of three months, of convulsions. None of the previous children have had umbilical hemorrhage. During the past winter Mrs. S. has suffered much from poverty and want, her food being small in quantity, and of the poorest quality, but so far as can be ascertained from her account, neither exclusively animal nor vegetable. She was delivered of the present child on the 9th of this month, was attended by a midwife. Three days after birth the infant became jaundiced, generally over integument. Its bowels at that time were freely open, and the discharges of a yellow color. When about a week old, the infant began to vomit several times daily, and the vomited matter contained traces of blood. The cord fell off on the fifth day. About the eleventh day a discharge of blood was first noticed from the umbilicus, which has continued till the present time. There has never been any blood in the stools.

Present appearance.—Child well developed, and rather large; its skin of a deep icteritious tint, which extends to ocular conjunctivæ, and soft palate. Back of hands and phalanges of fingers of a well-marked purplish hue; lower extremities faintly mottled with purple. Lips exsanguine; mucous membrane presents numerous small aphthous spots. Child's general strength appears to be good; its cry is strong, and it nurses well. Respiration normal. Pulse 150, obliterated on slight pressure. Tongue somewhat furred and moist. Fecal discharges semi-solid, of a bright yellow color. Urine strongly

yellow. Blood evidently serous in its character, and of a fainter color than normal arterial blood, is oozing from the general surface of umbilicus. It shows no tendency to coagulate.

Treatment.—A small pledget of lint, wet with tr. ferri chloridi, was applied to bleeding surface, and held by the point of the finger till the hemorrhage was apparently arrested, when a graduated compress was placed above it, and the whole retained by strips of sticking plaster. Ordered the following internally: ℞.—Quiniæ sulphatis, gr. viij; acidi tannici, gr. v; aquæ, ℥ij.—M. A teaspoonful every three hours.

June 27. Hemorrhage was not permanently arrested by yesterday's application. It returned in the afternoon, and has soiled three binders since. Patient has vomited four or five times, mostly after taking medicine; a little blood in ejecta, three dejections of yellow color and good consistency.

Two curved surgical needles are now inserted at right angles beneath the base of the umbilicus, and a waxed ligature wound round each in a figure of 8. Omit prescription of yesterday. ℞.—Tr. ferri chloridi, tr. opii camphorat., āā ʒij; syr. simp., ℥ij.—M. A teaspoonful every three hours. ℞.—Hydr. cum cret., gr. ij; P. rhei, gr. j.—M. Ft. pulv. Every night and morning.

28*th.* Hemorrhage entirely arrested. Parts about the ligature swollen. Abdomen generally tender on pressure. Icterus as before, perhaps not quite as deep. Lower lip drawn in, and mental fold deep. Has not again vomited; no dejections. Does not nurse with as much avidity. If laid on its right side it shrieks with apparent pain. Pulse 160. Had several short convulsive attacks during the night.

29*th.* Face more contracted and anxious. Pulse 184, irritable. Respiration 74. Had convulsions, lasting five minutes, repeatedly. During the night two small greenish dejections, containing no blood. Has taken but little of the mixture, but takes powders regularly. Respiratory murmur of chest normal. Blood is again flowing from umbilicus, oozing from the general surface and from the points of insertion of the needles. This commenced last evening. Parts about umbilicus excessively swollen, and of a purplish hue. The application of an additional ligature is considered unadvisable. Purpuric spots about back of hands less marked.

30*th.* Frequent convulsions during the night; child died at 10 this A. M.

Autopsy.—4 hours P. M. External appearance. Body very well

developed. Icterus as during life. Parts about ligature very much swollen, and of a deep purple color, to the extent of an inch. Fine sub-integumental crepitus is felt on palpation over whole abdominal surface. Limbs stiffened. Fingers strongly flexed, and thumbs turned into palms of hands.

Internal examination.—On making abdominal incision, the parts about ligature are found to be a confused mass of disorganized tissue, and effused blood of a dark venous color. Lungs healthy; except at posterior portion. Peritoneal cavity, and external cavity of intestines, normal. Both umbilical arteries are pervious to the sloughy mass surrounding ligature. Umbilical vein is obliterated to about half an inch from umbilicus. Ductus venosus still pervious, but apparently contracted in diameter. Liver of a uniform deep bronze color, externally and internally. Weight, 9 oz. Its substance firm. On pressure of its substance, a moderate quantity of venous blood comes from cut surface, apparently from divided veins. Gall-bladder, of flesh color externally, is filled, but not distended, with a viscid fluid, of the consistency of white of egg, of a very faint yellow color, holding in suspension minute whitish flocculi. These flocculi, examined under the microscope, present irregularly-shaped cells, filled with granules, but no nuclei. An attempt to pass a fine probe, from the gall-bladder through the cystic duct to its union with the ductus communis choledochus, was at first unsuccessful, but after repeated efforts, a small pin was passed, with its head directed forwards to the junction of the ductus communis. The hepatic duct was pervious upwards to the liver; but the liver having been severed from its connection with the duodenum, it was impossible to ascertain the condition of the ductus communis throughout its whole extent, but there was no evidence of constriction of this duct. Heart normal. Foramen ovale will admit a crow-quill. Ductus arteriosus pervious, but its walls are lined with lymph, as if its obliteration was commencing. Internal surface of arteries and veins normal.

CASE III.—(Communicated by Dr. Edwards Hall, of N. Y.) Mrs. B. was delivered, Jan'y 10th, 1855, of an unusually robust male child, which weighed at birth 12 pounds, and was apparently every way perfect. During the first week an eruption of the nature of strophulus made its appearance, attended with more than ordinary perspiration; the eruption, after about 48 hours continu-

ance, suddenly receded, and the child became restless and feverish, and nursed more greedily, while, at the same time, the urine was diminished. About the 24th inst., icterus made its appearance, and soon after an erysipelatous swelling of one of the testicles, followed soon after by swelling of the other. On the 25th the left arm began to swell, rapidly extending from the middle of the arm to the fingers. It presented very much the appearance of erysipelas. On the 30th, fluctuation was very distinct, so much so that I expected the abscess would soon burst at one point. As it appeared to be large, I thought it safer to make a slight puncture, and thus control the escape of matter, than to leave it to itself. To my surprise, I found nothing but blood, and closed the puncture by means of adhesive straps. About six hours after, I again opened the tumor, but with the same result. On this day, or the day following, oozing of blood began at the umbilicus, which had entirely healed. No means were of the least use in arresting the hemorrhage. It steadily increased, together with the tumor on the arm, which had reached the shoulder, and extended to the axilla, and under the pectoralis muscle. The little sufferer expired on the 2d of Feb'y, aged just three weeks. The surface, at time of death, presented a highly jaundiced appearance, with occasional petechial spots.

CASE IV.—(The notes of this case and of Case V. were communicated by Dr. S. S. Purple.) A male child, born of healthy parents, at full term. Cord fell off on the third day. On the fourth, presented symptoms of a mild attack of jaundice. On the fifth day, hemorrhage from the navel set in, when it was observed that ulceration existed. The ulceration was treated with a solution of tannin, and compression by means of scrapings of sole leather. On the seventh day, severe hemorrhage from the bowels set in, from which the child died. The bleeding from the navel was not severe, and was arrested by the applications used.

CASE V.—Female child, feeble, father syphilitic. Cord separated. On the 6th day after birth, hemorrhage from the navel set in. Child was then severely jaundiced. Simultaneously with the occurrence of bleeding from the navel, purpuric spots appeared on the surface. The bleeding being severe from the navel, sulphate of copper, tannin, compression, &c., were used to no avail. Bleeding from the nose, mouth, &c., set in. The child emaciated rapidly,

and died on the 10th day. In neither of the last two cases could an autopsy be obtained.

CASE VI.—(Communicated by Dr. George Benedict, of South Amboy, N. J.) Mrs. P. J. was confined, June 19th, 1851, of a male child; both mother and child did well until about the 6th day after the separation of the umbilical cord of the child. Hemorrhage of the umbilicus then occurred. I immediately applied powdered alum to the source of hemorrhage, over that a compress of cotton batting, and retained them by strips of adhesive plaster. No further hemorrhage took place, the dressings not being removed for four days. The child was alive and well in Dec., 1854.

CASE VII.—(Communicated by Dr. Benedict.) A female child, born in the 8th month, Sept. 14th, 1851, was healthy and doing well, with the exception of being much jaundiced, until one week had passed. The cord had separated, and at the end of the first week, hemorrhage from the umbilicus took place. Topical astringent applications checked the bleeding temporarily. It returned again in two or three days, was again checked, and after recurring several times, the child died at the end of the third week from birth.

CASE VIII.—(Communicated by Dr. J. H. Shearman.) Mrs. F., a feeble woman, who had previously lost one child of hydrocephalus, was delivered, in 1846, of a child at 7 months. The funis came away about the 7th day, from which time, hemorrhage from the umbilicus continued, more or less, until the child died, three or four days after. The employment of compression, and of the solid nitrate of silver, was of no benefit. The child bled also at the mouth, and a little at the ears. The blood was very fluid. There was no suspicion of syphilitic taint.

Besides the cases thus detailed, I present more brief memoranda of thirty additional cases, communicated by the gentlemen under whose notice they occurred. Dr. Edward Delafield has seen two cases. One which had jaundice died. The other recovered. Dr. Henry G. Cox, in 2000 births which have occurred under his supervision, at the Ward's Island Hospitals, has seen two cases. Both of the children were jaundiced. Both died. One was a feeble child. The mothers of both had been much depressed, and insufficiently nourished, during gestation. The hemorrhage came

on from one to three days after the falling of the cord. There was no suspicion of syphilis in either case. In private practice, Dr. Cox has seen one case. Not jaundiced. Powdered alum was applied to umbilicus, with pressure. The hemorrhage was permanently arrested.

Dr. J. T. Metcalfe has seen four cases, all were icterized, and all died.

Dr. Charles Henschel has attended two cases, both of which proved fatal. In one, the umbilical depression was filled with alum. In the other with tannin, with no evident benefit. One of the children was a girl; sex of the other not noted.

The Hon. ———, M. D., of North Carolina, has related to me the fact of two healthy children, of Mrs. L., also healthy, dying of umbilical hemorrhage within 48 hours after the falling of the cord, after the employment of astringents, and styptics with compression. The children, one male, the other female, were not twins.

Dr. Charles E. Isaacs has seen, in Niagara Co., at Baltimore, Md., and in the City of New York, three cases, of which one was icterode. All died.

Dr. C. R. Gilman has seen two cases. Neither jaundiced. Both recovered by use of pressure, and, perhaps, tannin.

Dr. B. F. Barker has been called in consultation to two male children, bleeding from the umbilicus. Powdered matico, with pressure, having failed, save partially, to arrest the flow of blood, the umbilicus was filled with powdered plaster of Paris, which proved effectual. There was no more bleeding, and the children recovered.

Dr. H. P. Dewees has reported to me one case. The application of alum and powdered ergot was unsuccessful, but pressure being made by a conical plug of cork, the hemorrhage ceased.

Dr. J. S. Thebaud was called to see a son of Dr. ———. The cord had fallen off on the 6th day, which was followed by hemorrhage. Compression was sufficient to check the bleeding, which did not recur on the removal of the compress, at the end of four days.

Dr. E. T. Winter saw a child in which the cord fell off on the 6th day from birth. Seven days after, bleeding from the umbilicus came on. Hemorrhage had existed 24 hours when Dr. W. saw the child. Alum and the solid nitrate of silver had been applied without benefit. The surface was yellow. Dr. W. filled the umbilical depression with tannin, and bound over it a compress spread with

moistened tannin. The compress was left on several days, and no more hemorrhage occurred.

Dr. George T. Elliot, Jr., has seen three cases. Styptics, compression, in one instance the ligature *en masse*, and in one, filling the umbilicus with plaster of Paris, all proved useless. All the patients died.

Dr. Joel Foster was called to a feeble male child in consultation. Icterus was present. The ligature *en masse* was applied, which arrested the bleeding, but ecchymosis around the ligature ensued, and the child died.

Dr. John L. Vandervoost has had two infants under his charge, with umbilical hemorrhage, after the falling of the cord. They were both males. One a black child. The white child was jaundiced. Both died, one 24 hours after the hemorrhage commenced; the other at the end of two days.

Dr. A. Gescheidt had in charge a feeble male infant, born of healthy parents. Two days after birth it became deeply jaundiced. The cord fell off on the 8th day, simultaneously with which a bleeding from the umbilicus commenced. It was treated without benefit by the application of compression, astringents, and styptics; and the ligature *en masse*, as recommended by Dubois, was equally unservicable. The hemorrhage terminated fatally 48 hours from its commencement.

Dr. F. A. Thomas saw, in 1853, at the Colored Home, in the city of New York, a healthy light mulatto child, born of a healthy mother. The mother was very dark. The cord separated on the 7th day, and an oozing of blood from the navel was almost immediately noticed. It was treated by astringents, the solid nitrate of silver, and compression, but without benefit, and died seven days after.

For the outline of other cases, more recently communicated to me, I must refer to the table of cases hereto appended.

Table of 178 *Cases of Hemorrhage*

NO.	AUTHORITY AND REFERENCE.	SEX.	HEREDITARY HISTORY, CHARACTER OF LABOR, ETC.	CONDITION AT BIRTH.	DATE AFTER BIRTH WHEN	
					CORD SEP'D.	HEM. BEGAN.
1	G. Watts (Gentleman's Magazine, Lond., vol. xxii. p. 172).				7th day.	11th day.
2	Dr. John Cheyne (Essays on Diseases of Children, Edinburgh, 1801, essay ii. p. 8).	F.		Remarkably stout and healthy.	6th day.	16th day.
3	G. Pout, Esq. (Med. Chir. Trans., vol. xii. p. 183, Lond., 1822).	M.	Mother had lost two other children (Nos. 4 & 5, infra), under like circumstances, and had three fine children living.	Healthy.	6th day.	8th day.
4	G. Pout, Esq. (loco citat).		Same mother as Nos. 3 & 5.			
5	G. Pout, Esq. (loc. cit.).		Same mother as Nos. 3 & 4.			
6	Dr. Elsaesser (Hufeland's Jour. der Pract. Heilk., and Med. Rev., Phila., 1824, p. 279).	M.	Hemorrhagic tendency in family; parents and grandparents healthy.	Appeared perfectly healthy.		14th day.
7	Thomas Radford, Esq. (Edin. Med. & Surg. Jour., vol. xxxviii. p. 4, 1832).				7th day.	7th day.
8	Thomas Radford, Esq. (loc. cit.).				8th day.	8th day.
9	Med. Chir. Rev., vol. xxv. p. 232, from Jour. der Pract. Heilk.	M.	Mother delicate and liable to profuse menorrhagia; had lost three children from umb. hem.; three others, though delicate, showed no hemorrhagic tendency.	"Tolerably healthy, though fair or almost white."		
10	Med. Chir. Rev. (loc. cit.).		Same mother as Nos. 9, 11, & 12.			
11	Med. Chir. Rev. (loc. cit.).		Same mother as Nos. 9, 10, & 12.			
12	Med. Chir. Rev. (loc. cit.).		Same mother as Nos. 9, 10, & 11.			
13	Dr. Tiemann (Amer. Med. Intelligencer, vol. iii. p. 44, Phila., 1840, from Med. Zeits. v. Vereine für Heilk. in pr., 1837, No. 42).	M.		Tender and feeble, jaundiced.	3d day.	7th day.
14	Dr. Jecker (Fricke & Oppenheim's Zeits., 1841, vol. v.).				7th day.	10th day.
15	Van Siebold's Journal, vol. ix.				9th day.	
16	Dr. Churchill (Op. Midwifery, Dublin, 1841, p. 296).					
17	Dr. Churchill (loc. cit.).					
18	Dr. A. B. Campbell (Northern Jour. of Med., vol. i. p. 237, Edinb, 1844).	F.	Mother had previously two healthy children.		5th day.	9th day.
19	Dr. A. B. Campbell (loc. cit., also Lond. Med. Gazette, 1850, vol. xlv. p. 757).	M.	Mother had previously two healthy girls.		5th day.	7th day.
20	Dr. A. B. Campbell (loc. cit.).	M.	Same mother as No. 19.		6th day.	7th day.

from the Umbilicus in Infants.

SYMPTOMS.	TREATMENT.	RESULT.	AUTOPSY AND REMARKS.
"The blood drilled in an equable uniform stream down the belly," recurring at intervals.	Styptics, with compression.	Death within 36 hours.	The hemorrhage "seems to have proceeded from the vena umbilicalis, and in no wise from the arteries, for the blood drilled," &c., vide Symptoms.
Became jaundiced the third day after birth; occasional fits of pain; costiveness; stools white, with streaks of bile; urine stains linen deeply; emaciated on 13th day; slight hemorrhage on 16th day; profuse and fatal on the 18th day.	Infusion of senna for costiveness.	Death 36 hours after hemorrhage began.	Umbilical vein pervious and empty; arteries open and containing grumous blood; intestines tinged from bile *in their coats;* mesenteric glands large and white; liver full and firm, and of a dark-green earthy color; gall-bladder empty and contracted; ducts contracted, but pervious, firm, and white; section of liver showed same firmness of ducts.
Bleeding continued steadily till death; point whence it issued not distinguishable.	Plugging with lint, and pressure by means of adhesive straps and roller.	Death 27 hours after hem. began.	Umbilical vein dilated and full of fluid blood; umb. arteries pervious, retracted, and the left containing coagulated blood.
		Death.	
		Death.	
Illness began on the 8th day, with drowsiness and rattling in the throat; bled continuously until death.		Death in 48 hours.	Navel was apparently healed some days before hemorrhage began.
	Graduated compress and adhesive plaster.	Death in 15 hours.	Umbilical vein uncontracted; umbilicus sloughy, dark, and ragged.
	Compress and adhesive strip.	Recovered.	Hemorrhage ceased spontaneously.
Jaundice, aphthæ, convulsions, and diarrhœa; oozing of bloody serum from cut end of cord; after its separation, pure blood from umbilicus; scrotum purpuric.	Styptics.	Death on the 9th day after birth.	
Bleeding from the navel.		Death on the 8th day from birth.	
Bleeding from the navel.		Death on the 12th day from birth.	
Bleeding from the navel.		Death on the 14th day from birth.	
Increase of jaundice; fretfulness; constipation; stools without bile; hemorrhage from the nostrils, mouth, and bowels.	None mentioned.	Death on the 14th day from first bleeding.	The blood appeared to be venous.
	Ferrum candens.	Death.	Hemorrhage was supposed to depend on non-obliteration of the umbilical arteries.
		Death.	Hemorrhage came on after separation of cord.
	Attempted to plug the navel.	Death.	
	Attempted to plug the navel.	Death.	
Jaundiced the third day after birth; stools light; urine brown; hem. began after a fit of coughing; blood contained a large amount of bile, as shown by stains.	Caustics and compression of temporary benefit.	Died about 30 hours after hem. began.	Internal organs, except liver, spleen, pale, yellow, and bloodless; liver of normal size, soft, and full of dark bile; gall-bladder collapsed; excretory ducts of liver and of gall-bladder wholly absent.
Became jaundiced on the third day after birth.		Died 4 days after hem. began.	
Jaundiced on the third day; hem. began by a slight oozing; estimated loss of blood, ℥iss.	Astringents, styptics, and pressure of temporary benefit.	Died comatose 4 days after hem. began.	Surface and internal organs, except liver and spleen, yellow; navel healthy; liver slightly congested and dense; gall-bladder partially filled with bile retained by plug of inspissated bile in *ductus choledochus.*

NO.	AUTHORITY AND REFERENCE.	SEX.	HEREDITARY HISTORY, CHARACTER OF LABOR, ETC.	CONDITION AT BIRTH.	DATE AFTER BIRTH WHEN	
					CORD SEP'D.	HEM. BEGAN.
21	Dr. Ulsamer (Neue Zeitschrift für Geburtskunde, vol. xvii. p. 271, 1845).					
22	M. Jeunin (Revue Médicale, Paris, Sept. 1847, p. 87, vol. xcix).	M.			6th day.	7th day.
23	Dr. Olliffe (Lond. Med. Times, April 3, 1847, vol. xvi. p. 116, or M. Paul Dubois, Archiv. Gén. de Méd., Oct. 1849, p. 187, or Virg. Med. & Surg. Jour., Oct. 1853, p. 53, case ii.).	M.		Small and delicate.	6th day.	11th day.
24	Dr. J. Y. Simpson (Edinburgh Monthly Jour. of Med. Science, July, 1847).		Parents healthy; child born in India.			
25	Dr. J. Y. Simpson (loc. cit.).		Same parents as No. 24; child also born in India.			
26	Dr. E. J. Marsh (New Jersey Med. & Surg. Rep., vol. i. p. 181, 1848).					
27	Dr. E. J. Marsh (loc. cit.).					
28	Dr. T. F. Cock (N. Y. Annalist, vol. ii. p. 189).	F.			5th day.	8th day.
29	M. Villeneuve (Gaz. Méd. de Paris, Mar. 11, 1848, p. 191).					9th day.
30	M. Thore (Gaz. Méd. de Paris, Mar. 11, 1848, p. 191–2, and Virg. Med. & Surg. Jour., Oct. 1853, p. 55).	M.		Apparently well.		13th day.
31	M. Emile Dubois (Thése de Paris, 1848, No. 241, or Archiv. Gén. de Méd., Oct. 1849, p. 188, or Lond. Med. Gaz., May, 1850, p. 757, or Virg. Med. & Surg. Jour., Oct. 1853, p. 55).	M.		Of good constitution.	7th day.	8th day.
32	Mr. Edward Ray (Lond. Med. Gaz., vol. xliii. p. 423, Mar. 1849).	M.	Mother bled largely two years before from injuries received by being thrown from a chaise.	Feeble; jaundiced; refused both breast and food.		
33	Mr. Edward Ray (loc. cit.).	M.	Same mother as Nos. 32 & 34.	Strong and healthy.		
34	Mr. Edward Ray (loc. cit.).	M.	Same mother as Nos. 32 & 33; short and natural labor.	Well formed and apparently strong and healthy.	6th day.	10th day.
35	Mr. Edward Ray (loc. cit.).	M.	These four male children were of the same parents; two female children did not bleed.			
36	Mr. Edward Ray (loc. cit.).	M.				
37	Mr. Edward Ray (loc. cit.).	M.				
38	Mr. Edward Ray (loc. cit.).	M.				

SYMPTOMS.	TREATMENT.	RESULT.	AUTOPSY AND REMARKS.
	Nitrate of silver, alum, and kino; filled the navel with soft wax.	Death.	
	Nitrate of silver, compression, and hot iron unsuccessful; ligature *en masse* came away fourth day, leaving perfect cicatrix.	Recovered.	Bouchat (*Dis. of Child.*, Eng. ed. Lond. 1855, pp. 131–2) says, this patient afterwards died of purpura, but this is doubtful.
Steady oozing; icterus; purpuric spots on tongue and palate; bloody dejections; after ligature, which arrested the hemorrhage, continued in a state of great debility until death.	Ice; nitrate of silver; colophony; eau Brochieri—all failed: the ligature *en masse* arrested the hem. completely, and the eschar falling off, there was perfect cicatrization.	Died purpuric seven weeks from birth.	Umbilical vein nearly obliterated; left umb. artery obliterated; right pervious, its inner coat presenting nodosities containing small clots; liver large, of natural color; submucous hem. about colon, and blood in lateral ventricles of brain and sub-arachnoidean space; ductus venosus closed; ductus arteriosus and foramen ovale not completely.
Hem. came on some days after funis separated; jaundice.	Pressure and styptics.	Died on 11th day.	
Hem. came on as in No. 24; jaundice.	Pressure and styptics.	Died on 11th day.	The walls of the umbilical vessels were much thickened and indurated, as high up as the liver.
Jaundice.	Compression, astringents, and escharotics.	Death.	
Jaundice.	Compression, astringents, and escharotics.	Death.	
Icterus; slight oozing at first; ecchymosis on the 10th day.	Compression and burnt alum, tannin, plaster of Paris, creasote, and matico.	Death 2 days after hem. began.	
Recurred four times.		Death 42 hours after hem. began.	
Hem. preceded by violet spots on skin; hem. slight, blood serous; after arrest of hem. was buccal and gastric hem., purpura, diarrhœa, œdema, and muguet.	Compression, powdered alum, and arg. nit. stopped hem. after six days.	Died 24 days after hem. began, and 18 after it ceased.	Liver, bright yellow, and of normal consistence; navel nearly healed; umb. arteries, pervious, filled with pus, clots, and fluid blood; umb. vein empty and contracted; foramen ovale and ductus arteriosus incompletely obliterated.
Blood flows freely without impulse from opening at bottom of umbilicus; after arrest of hemorrhage, vomiting, diarrhœa, tympanitis, ending in coma.	Pressure with the fingers, arg. nit., colophony, and spunk, only of temporary use; ligature *en masse* permanently checked the hemorrhage.	Died 12 days after hem. of enteritis.	Umb. vein and ductus venosus collapsed, not obliterated; ductus arteriosus and foramen ovale incompletely closed; umb. arteries resembled whitish cords with narrow canal, and containing adherent filiform clot; tissues exsanguined.
		Death 19 days after birth.	
Became jaundiced a few days after birth.		Death on the 11th day after birth.	
Jaundice on the third day after birth; constipation and light stools; blood thin, of light vermilion hue; oozed in fine stream evidently from left umb. artery; ecchymosis on left arm.	Compression, astringents, styptics; double ligature was followed by oozing from the needle's puncture; single ligature controlled hem.; beef tea and ammoniæ carb.	Death 46 hours after hem. began.	Liver of normal size and olive-brown hue; ecchymosed; cystic, hepatic, and common ducts open; umb. vessels pervious, except where tied; blood fluid. Three female children of this lady lived and were healthy.
Purpura.		Death.	These four cases were attended by Drs. Key and Babbington.
Purpura.		Death.	
Purpura.		Death.	
Purpura.		Death.	

NO.	AUTHORITY AND REFERENCE.	SEX.	HEREDITARY HISTORY, CHARACTER OF LABOR, ETC.	CONDITION AT BIRTH.	DATE AFTER BIRTH WHEN	
					CORD SEP'D.	HEM. BEGAN.
39	Dr. John Homans (Boston Med. & Surg. Jour., July 11, 1849, p. 449.	M.		Healthy.	9th day.	6th day.
40	Dr. John Homans (loc. cit.).	F.		Healthy.	4th day.	4th day.
41	Dr. John Homans (loc. cit.).	M.		Remarkably symmetrical and healthy.	5th day.	6th day.
42	Dr. John Homans (loc. cit.).	F.		Healthy.	5th day.	18th day.
43	Dr. John Homans (loc. cit.).	M.		Healthy.		5th day.
44	Dr. John Homans (loc. cit.).	F.	Circulation in funis audible during the last weeks of pregnancy.			1st day.
45	Dr. John Homans (loc. cit.).	M.		Healthy.	5th day.	5th day.
46	Dr. Henry I. Bowditch (Am. Jour. Med. Sciences, vol. xix. p. 63, et seq., Jan. 1850).	F.	Mother a stout healthy young woman; labor natural; first child.	Quite healthy.	3d day.	14th day.
47	Dr. Henry I. Bowditch (loc. cit.).	M.	Same mother as No. 46; 4th child; two intervening male children show no tendency to hem.; labor natural.	Plump and hearty.	5th day.	10th day.
48	Dr. F. Amyot (Lond. Med. Times, vol. xxi. p. 449, 1850).	M.	Father healthy; mother delicate.	Rather weakly.	6th day.	6th day.
49	Dr. W. C. Anderson (Boston Med. & Surg. Jour., vol. xli. p. 440, Jan. 2, 1850).	F.	A sister of this child had jaundice and purpura at four months of age, terminating favorably.	Apparently healthy.		11th day.
50	Dr. W. C. Anderson (loc. cit.).		Mother lost a former daughter, on the 5th day, with jaundice and purpura, but without hem.			

SYMPTOMS.	TREATMENT.	RESULT.	AUTOPSY AND REMARKS.
Slight hem., resisting all control until separation of cord.	Styptics, argent. nit., and compression.	Recovery.	
Profuse hem. a few hours after separation of cord; subsequent hem. from bowels; drowsiness; sallow countenance and indications of pain.	Compression, styptics, arg. nit., a long time useless; hem. finally checked by compress of scrapings of sole leather firmly secured by straps.	Recovery.	Had jaundice at six years, from which she recovered readily.
Hem. recurred 3 times; navel became inflamed and swollen from applications; icteric on the 8th day.	Compression failed; arg. nit. and collodion, several times repeated, finally effectual.	Recovery.	Was uniformly well one year later.
Jaundice, purpura, and bleeding from the gums.	Compression and argent. nit.	Death 5 days after hem. began.	
Colicky pains and green stools when first seen; jaundice, purpuric spots on skin.	Compression by finger once stopped hem. 12 hours; ice, creasote, argent. nit., hot iron, lint soaked in solution of shellac, tr. fer. muriat., all useless.	Death.	Hem. came from a point within navel one-quarter size of caliber of cord.
Hem. from funis until 4th day; then from navel; œdema, ecchymosis; circumscribed spots on limbs of stony hardness.	Compression and styptics.	Death on the 5th day.	Surface yellowish; extravasation of blood under skin into lungs and parietes of intestine; blood in heart pale and thin; no clot; no blood or clot in umbilical vessels; arteries traceable into funis.
Ecchymosis about funis on the 2d day after birth; purpuric spots universally soon after.		Death on the 5th day, a few hours after hem. began.	No hemorrhagic tendency has been known in the parents of Nos. 39—45.
Oozing of thin arterial looking blood; slight colics; bloody stools; ecchymosis.	Compression, astringents, arg. nit. seemed to increase hem.; double ligature through navel unsuccessful; two needles at right angles encircled by ligature arrested hem. for a time.	Death 6 days after hem. began.	
Colic occasionally on the fifth day; dejections whitish; urine highly colored by bile; slight icterus; ecchymosis; no coagulation of blood; a streak of blood once in stool.	Filled the navel with tannin, and over it compress of spunk; calomel, ol. ricini, sodæ sulph.; actual cautery by means of knitting needle.	Death 4 days after first ecchymosis.	Surface sallow, but in spots livid from extravasation; no coagula in heart or umb. vessels, which latter were closed; liver large, flaccid, yellowish, soft, adhering to cloth and staining like feces; gall-bladder small and empty; ducts pervious.
Hem. from scrotum on the 5th day; umb. hem. free, oozing from tongue, mouth, and gums; hem. from stomach and bowels; ecchymosis on pressure.	Alum, matico, catechu restrained the hem. but temporarily.	Death on 7th day from 1st hemorrhagic symptom.	
Intense jaundice; stools clay colored; urine dark; purpuric spots appeared simultaneously with the hem., which was a continuous oozing.	"All the usual means of arresting hemorrhage."	Death 28 hours after hem. began.	Tissues all yellow; mucous memb. of stomach ecchymosed; liver large and reddish-brown; gall-bladder distended with greenish-yellow bile; ductus communis coledochus terminated in *cul-de-sac;* fœtal openings closed, except the umb. vein, whence the hemorrhage flowed.
Jaundice and purpuric spots.		Death on the 8th day after hem.	

NO.	AUTHORITY AND REFERENCE.	SEX.	HEREDITARY HISTORY, CHARACTER OF LABOR, ETC.	CONDITION AT BIRTH.	DATE AFTER BIRTH WHEN	
					CORD SEP'D.	HEM. BEGAN.
51	Dr. John Manley (Lond. Med. Gaz., vol. xlv. p. 755, May 3, 1850).	M.	Labor natural.	Apparently healthy.	5th day.	
52	Dr. W. C. Bailey (Amer. J. of Med. Sci., April, 1852, p. 432).	M.	Parents healthy; labor short and easy.	Healthy.	3d day.	9th day.
53	Dr. W C. Bailey (loc. cit.).	F.	Same parents as No. 52.	Healthy.	4th day.	9th day.
54	Dr. W. C. Bailey (loc. cit.).	M.	Labor short and easy.	Healthy.		12th day.
55	Dr. Henri Roger (L'Union Médicale, Mar. 24, 1853, vol. vii. p. 138, and Virg. Med. & Surg. Jour., Oct. 1853, p. 53).	F.		Small but well formed and active.		13th day.
56 57 58	Dr. Henri Roger (loc. cit.). Dr. Henri Roger (loc. cit.). Willard Gage (Western Lancet, Sept. 1853, p. 552.)		Twins born at eight and a half months.	Delicate.	7th day. 7th day. 8th day.	10th day 10th day 8th day.
59	Dr. George A. Otis, (Virginia Med. & Surg. Jour., vol. ii. p. 51, Oct. 1853).	M.	Mother healthy; labor natural; no hemorrhagic tendency in family.	Small but well formed.	7th day.	14th day.
60	G. F. B. Willing, Esq. (Med. Times & Gazette, March 25, 1854, p. 287).	F.	Mother healthy; sanguineous temperament; labor short and easy.		7th day.	13th day.
61	Dr. Augustus A. Gould (Boston Med. & Surg. Jour., vol. liii. No. 6, Sept. 6, 1855).	M.	Parents healthy and cousins; labor easy under ether.	Weight 9 lbs.; had congenital ichthyosis, as had a previous child (not No. 62).	5th day.	9th day.

SYMPTOMS.	TREATMENT.	RESULT.	AUTOPSY AND REMARKS.
"Soon after" separation of cord, spots of blood on linen; jaundice; dejections lightish, and bowels much relaxed; on 14th day oozing increased, blood thin, pale, and non-coagulable.	Nit. arg., graduated compress, kept in place by thumb, alum, Ruspini's styptic; actual cautery; internally, hydr. cum cret.	Death on the 17th day from birth.	
Sixth day, constipation, clay-colored stools; pain on extending legs; hem. slight at first; free on the 10th day, in a fine pulsatile jet, from left to right; ceased spontaneously five hours before death.	Compress of cobweb, zinc, lead, arg. nit., and actual cautery, only seemed to stimulate the hem.; pressure by thumb.	Death 48 hours after hem. began.	Body became of a saffron hue four hours after death.
On the 5th day stupid, costive, stools clay-colored; icterus; cries only when legs are extended; purpuric spots about 15th day.	Internally, calomel, hydr. cum cret., ol. ricini, and sustaining diet; matico and burnt alum useless; ligature under needles restrained hem. 14 days.	Death 22 days after hem. began.	The mother of these two children has two healthy children (male and female) living.
Icterus on 2d day; stools scanty and clay-colored.	Hydr. cum cret., ol. ricini, infus. taraxaci.	Death 24 hours after hem.	Hem. ceased spontaneously.
Diarrhœa, with green and glairy dejections; skin pale and cold; bleeding slight *en bavant;* blood of a light color.	Astringents, pressure, arg. nit., actual cautery.	Death 2 days after hem. began.	No jaundice, or purpura, or hem. from internal organs; no alteration of liver; foramen ovale nearly, and duct. arteriosus entirely closed; umb. vein healthy, and closed by firm clots; right umb. artery double usual size, pervious, and filled with half coag. blood; inner surface black and wrinkled; left artery like right in less degree.
	Ligature *en masse.*	Death.	
	Ligature *en masse.*	Death.	
Oozing of sanious fluid, which deepened into a percolating hem. in 48 hours.	Styptics and astringents for 4 days uselessly; applied concavity of thimble over navel, which stopped the hem.; thrown off by firm cicatrix.	Recovery.	
Icterus 3d day; dejections clay-colored; face wrinkled, lips pallid; ecchymosis on tongue and palatine arch; vomited matters tinged with blood; hem. profuse; blood non-coagulable; bloody dejections and purpura.	Compression, astringents, styptics, argent. nit., perchloride of iron, a *serre-fine,* checked hem. for some hours, and ligature *en masse* permanently; internally, tr. fer. chlor., opium, and nourishing food.	Death 44 hours after hem. began.	
Jaundiced within 12 hours of birth; stools without bile on the 3d day; benefited by purging; navel healthy on separation of cord; on 13th day, slight oozing; blood did not coagulate.	Tannin, matico, alum, graduated compress, plaster of Paris retained by finger, lint and sesquichloride of iron, nit. arg., all unsuccessful; cobweb, saturated with tr. ferri sesquichlor., retained by pad and adhesive strap, checked hem.; beef tea and stimulants internally.	Death 3½ days after hem. began, 17 hours after its cessation.	Surface blanched but yellow; liver dark, and gorged with blood; gall-bladder much contracted; umb. vein pervious, with thickened walls near orifice, and contained a small clot; left artery pervious, containing fluid blood; right closed; duct. arteriosus and duct. venosus open; spleen soft; supra-renal capsules non-adherent; excess of serum in pericardium; ecchymosis on lower lobe of left lung; foramen ovale open; blood every where fluid.
Alvine discharges, free from bile and frequent; hem. oozing at first, afterwards escaped in a fine jet; slight exudation of blood at anus; jaundiced; urine amber-colored.	Tannin and compression, arg. nit., ligature, alum, and collodion, without much effect.	Death on the 3d day after hem. began.	Umbilical vessels all pervious; liver dark colored, friable, and gorged with blood; gall-bladder contained a drachm of serous fluid; common and cystic ducts impervious.

NO.	AUTHORITY AND REFERENCE.	SEX.	HEREDITARY HISTORY, CHARACTER OF LABOR, ETC.	CONDITION AT BIRTH.	DATE AFTER BIRTH WHEN	
					CORD SEP'D.	HEM. BEGAN.
62	Dr. Augustus A. Gould (loc. cit.).	F.	Same parents as No. 61; born under the use of ether.	Weight 8¼ lbs.; ichthyosis as above.	5th day.	6th day.
63	Dr. Stephen Smith (N. Y. Journal of Medicine, July, 1855).		Mother had syphilis; child born at seven months.		5th day.	5th day.
64	Dr. Stephen Smith (loc. cit.).	M.	Second child; parents healthy.	Healthy.		4th day.
65	Dr. Stephen Smith (loc. cit.).	F.	First child; parents healthy.			2d day.
66	Mr. Keiller (Ranking's Abst., Amer. ed., vol. vi. p. 270).	M.		Plump and hearty at birth.		
67	Dr. Evert (in Dr. Stephen Smith's table, loc. cit., No. 21).	M.	Mother had syphilis two years before.	Feeble; had eruption.		8th day.
68	Dr. Condie (Treat. on Dis. of Children, 3d ed., p. 636).					
69	Dr. Condie (loc. cit.).					
70	Dr. Condie (loc. cit.).	M.				
71	Dr. Francis Minot (from Table of Cases arranged for analysis, vide Amer. Jour. Med. Sciences, Oct. 1852, p. 310).	F.	Mother feeble; one miscarriage from an accident; present confinement about 8th month, as she supposes from fright; had some uterine hemorrhage a few weeks after confinement; labor natural.	Feeble.	7th day.	13th day.
72	Dr. Minot (loc. cit.).	F.	Mother healthy; labor natural; cord not tied until pulsations had ceased.	Feeble.	6th day.	
73	Dr. Minot (loc. cit.).	M.	Mother delicate; has had several miscarriages; labor easy.	Small but nursed well.	6th day.	3d day.
74	Dr. Minot (loc. cit., communicated by Dr. A. Hooker).	M.	Mother's health not quite as good as during former pregnancies; appetite good; no nausea after eating, but vomited bile and mucus; in two former pregnancies vomited food, but no bile; labor natural.	Appeared well.	6th day.	4th day.
75	Dr. Minot (loc. cit., communicated by Dr. A. Hooker).	F.	Same mother as No. 74; mother's health same as in preceding pregnancy; labor natural and easy.	Perfectly well.		10th day.

SYMPTOMS.	TREATMENT.	RESULT.	AUTOPSY AND REMARKS.
First evacuation like meconium, subsequent ones not bilious; jaundiced on the sixth day.	Little effort was made to check it.	Death 2 days after hem. began.	Umbilical vessels pervious; liver congested and of a bronze-green color; little gelatinous fluid in gall-bladder; cystic duct closed, and hepatic as far as could be made out; common duct dilated; intestines unusually pink colored.
Hemorrhage oozing.	Caustic with tannin and compress; burnt alum and tr. ferri mur., plaster of Paris, used but not so as to test its virtue.	Death on the 2d day.	
Hem. free; arterial from left side of cord at its attachments.	Nit. argent., tannin, and compress, arrested flow temporarily.	Death in 1 hour.	Child exhausted when first seen; crying excited return of hemorrhage.
Constant oozing.	Compressed sponge on tannin, with adhesive strip extending round body, arrested it temporarily; gave sulph. acid and iron, brandy, &c.	Died in 10 hours.	Hemorrhage recurred during the night, and child died without being observed.
Vomited from time to time; bleeding at root of cord.	Nitrate of silver; ligature around umbilicus.	Died 3 days after birth.	
Bleeding from left of navel and scrotum at first, three days after from skin.		Died on the 5th day.	Very marked case of syphilitic cachexia.
Percolation around root of cord at place of attachment to abdomen.	Arrested by powder of starch, sugar, and acetate of lead, constantly added.	Recovered.	
Same symptoms as No. 68.	Same treatment as No. 68.	Died.	Blood flowed too freely to allow paste to harden.
Jaundice over whole body; constipation; clay-colored stools; hem. ceased spontaneously.		Died.	
No jaundice; blood oozing, thin and pale, without coagulating; amount of blood lost not great.	Plaster of Paris, and compression.	Died in 6 hours.	
Skin yellow; bowels regular; dejections dark green; cord never separated; child almost comatose; blood, as in No. 71, oozing.	Lunar caustic, punk, lint, powdered alum, compression.	Died 36 hours after hem. began.	Liver natural in size, color, and consistency; ducts pervious; gall-bladder contains a small amount of bile; hemorrhage apparently increased by applications.
Jaundice on 2d day increasing in intensity; bowels constipated, but freely moved by medicine; urine yellow, then red; hem. first at root of cord, before separation; free hem. on separation of cord; blood thin and watery, and did not coagulate.	Mercurial purgatives, with oleum ricini and enemata; tannin checked the 1st hem.; dilute nitric acid gtt. ⅛ each 2 hours; ligature applied tightly around the navel controlled the hemorrhage.	Died 3 days after hem. began.	
Jaundice on the 4th day; hem. also began on the 4th day, the cord being still attached.	Hydr. c. creta; stimulants; the usual local applications, with pressure.	Death 6th day after hem. began.	The mother of this and the next child had had two previously, and though one of them had jaundice at the age of four or five years, they are now alive and well.
Jaundice on 4th day; same day rejected drinks, and dejections became green; the cord, which was dried and hard, was separated with scissors, on the 8th day, on account of chafing and swelling of adjacent parts; child more comfortable next day.	Treatment same as No. 74.	Death 1 day after hem. began.	

NO.	AUTHORITY AND REFERENCE.	SEX.	HEREDITARY HISTORY, CHARACTER OF LABOR, ETC.	CONDITION AT BIRTH.	DATE AFTER BIRTH WHEN	
					CORD SEP'D.	HEM. BEGAN.
76	Dr. Minot (loc. cit., communicated by Dr. A. Hooker).	F.	Mother healthy; first child; labor brought on at commencement of 9th month by severe attack of vomiting; breech presentation.	Appeared bright and well.		5th day.
77 78 79 80	Dr. Minot (Amer. Jour. Med. Sciences, ut supra, communicated by Dr. A. Hooker).		Mother healthy, and had good labors.		In all cord separated before hem. began.	
81	Dr. Minot (loc. cit., communicated by Dr. S. S. Wipple).	M.	Parents robust; labor in all respects natural.	Appeared perfectly sound; weight over 9 lbs.	7th day.	30 hours from birth.
82	Dr. Minot (loc. cit., Dr. Hayward's case, from Dr. J. B. S. Jackson's notes).			Tumor on head of the size of a cherry.		3d day.
83	Dr. Minot (loc. cit., 2d case of Dr. Hayward, from Dr. J. B. S. Jackson's notes).	M.	Born at full term.		5th day.	13th day.
84	Dr. Minot (loc. cit., from Boston Lying-in Hospital Records [Dr. Read], April 23 1852).	M.	Mother healthy; difficult labor; twins; first child (girl) shoulder presented; spontaneous evolution, breech presented; still born; second (boy) natural presentation.	Very feeble; moaning.		2d day.
85	Dr. Minot (loc. cit., from Boston Lying-in Hospital Records [Dr. Read], Feb. 9. 1850).	F.	Labor natural.		7th day.	7th day.
86	Dr. Minot (loc. cit., communicated by Dr. W. S. Townsend).	M.		Apparently healthy.	6th day.	18th day.
87	Dr. Minot (loc. cit., from Records of Boston Lying-in Hospital [Dr. L. Parks, Jr.], 10 Sept. 1851).	M.	Father had jaundice seven years ago; mother healthy; craved and ate freely of dandelions during pregnancy; labor natural and not severe.	Healthy; weighed 8 lbs.		5th day.
88	Dr. Minot (loc. cit., from Records of Boston Lying-in Hospital [Dr. L. Parks, Jr.], 14 Feb., 1853).	F.	Mother healthy; labor tedious (first child), but otherwise natural, followed by exhaustion and hemorrhagic pulse.	Feeble, and did not breathe until after the application of stimulants.	6th day.	5th day.
89	Dr. Minot (loc. cit., communicated by Dr. J. F. W. Lane.)	M.			"In due time."	10th day.

SYMPTOMS.	TREATMENT.	RESULT.	AUTOPSY AND REMARKS.
Slight jaundice soon after birth; hem. began before cord was detached; was separated same day [5th] by scissors; became very yellow before death.	Argent. nit., &c.	Died at close of 7th day.	
All had jaundice.		All died.	Has since had a child which, though slightly jaundiced, did not bleed, and did well.
Dejections natural and frequent; 30 hours from birth hem. from around umbilicus by exudation; blood non-coagulable; likened to cranberry juice; checked by cupri sulph.; 24 hours afterwards returned more profusely with prostration; rallied under tr. ferri mur. and brandy; improved till 9th day, when hem. returned; liver apparently acted well.	Checked at first by a solution of sulphate of copper; tr. ferri mur., and brandy, internally, seemed to be of service.	Died 8 days after hem. began.	The mother had been uneasy during the latter months of pregnancy, from the description of a child which had bled from the navel, and she spoke frequently to the nurse about it before her confinement.
Tumor increased on 4th day to a very large size, and apparently contained blood; child died same day with symptoms of compression of brain.	"Every effort" useless; double ligature through umbilicus of no avail.	Died in 24 hours.	
Never passed any thing like meconium or bile; dejections white like milk.		Died 7 days after hem. began.	Blood of heart extremely thin and pale, without coagula or fibrin; foramen ovale open; duct. arteriosus closed; stomach and intestines contain blood in considerable quantity; no ecchymoses; contents of gall-bladder, light amber-colored fluid.
On the 3d day continual oozing from whole length of cord below ligature; cord not separated; no icterus.		Died in 24 hours.	
Did well until 7th day, when hem., on separation of cord, in a very fine stream, which resisted all efforts to stop it; the child was yellow.	Matico, ligature.	Died in 48 hours.	
Umbilicus was apparently healed six days after birth; hem., which was not at any time profuse, continued six days; no jaundice.	Lint and compression, with strips of adhesive plaster and bandage.	Recovered.	
Very yellow on 3d day; vomiting; dejections dark colored; urine stains yellow; on 5th day, emaciation, convulsions, diarrhœa, ecchymosis in roof of mouth, hem. from umbilicus; 6th, diarrhœa, dejections dark-colored; cord not separated; loss of blood less than an ounce.	Collodion, pressure; internally, laudanum and calomel.	Died in 24 hours.	Heart and lungs healthy; spleen dark-purple; liver dark, very solid, not friable; gall-bladder greatly distended, translucent, not opened; ducts and umbilical vessels not examined.
Icterus on second day; vomits froth; 3d day, vomited blood, dejections free and black; 5th, bleeding; 6th, less hem. and less yellowness; 7th, less yellowness, no hem.; purple spot in left lumbar region.	Calomel.	Recovered.	
Did well until 10th day, when blood was discovered on dress; navel apparently perfectly healed; occasional hemorrhages, chiefly about 4 P. M.	Caustic.	Death in 5 days.	

NO.	AUTHORITY AND REFERENCE.	SEX.	HEREDITARY HISTORY, CHARACTER OF LABOR, ETC.	CONDITION AT BIRTH.	DATE AFTER BIRTH WHEN	
					CORD SEP'D.	HEM. BEGAN.
90	Dr. Minot (loc. cit., communicated by Dr. A. B. Snow).	F.	Mother healthy; labor natural.			
91	Dr. Minot (loc. cit., communicated by Dr. S. W. Butler).	M.	Mother a healthy colored woman; labor not long and "favorable."	Very well.		3d day.
92	Dr. Allaire (d'Héricy-sur-Seine), (Gaz. des Hôpitaux, Oct. 11, 1856), Paris.	M.			4 days.	9th day.
93	Dr. Charles Hooker (Trans. Amer. Med. Assoc., vol. viii. 1855, p. 451).	F.	No hereditary predisposition to purpura, but the mother had an inordinate thirst, which she freely indulged during pregnancy.		5th day.	9th day.
94	Dr. Charles Hooker (loc. cit., and note book).		Same condition as No. 93.			
95	Dr. Jefferson Church (Virg. Med. & Surg. Jour., March, 1857).	M.	Parents healthy, colored, "though few northern negroes are exempt from a scrofulous taint?"	Healthy.		48 hours.
96	Dr. J. Y. Simpson (Edinburgh Monthly Jour. of Med. Science, July, 1847, p. 70).					
97	Dr. J. Y. Simpson (loc. cit.).					
98	Dr. Steinthal. (Behrend's Jour. für Kinderkrankheiten, band 28, heft 1 u. 2, Jan. u. Feb. 1857, s. 44, Erlangen.)	M.	Mother healthy.	Well formed.	6th day, navel fully cicatrized.	20th day.
99	Dr. Steinthal (loc. cit., s. 45).	M.	Fifth child; others had not bled; labor easy.			3d day.
100	Dr. Steinthal (loc. cit., s. 46).	M.	Same parents as No. 99; labor easy.	Appeared well in every respect.	10th day.	3d day.
101	Dr. Abelin (Jour. für Kinderkrankheiten, Sept. u. Oct. 1857).	M.	Child prematurely born.			

SYMPTOMS.	TREATMENT.	RESULT.	AUTOPSY AND REMARKS.
Hem. at the end and at the root of funis; color of skin not altered.		Died on the 3d day.	
Began to bleed on the 3d day; was checked by bandage; soon recurred, and child died; cord not separated; hem. from edge of umbilicus; patient passed bloody urine.		Died in a few hours.	
Blood issued continuously from a fissure below, and to the left of the umbilicus.	Lint, amadon, pressure, and ligature *en masse*.	Died in 5 hours.	Deep in the fissure was discovered an open artery, admitting a probe, from which the hem. had evidently come.
Hem. began profusely 4 days after separation of cord; ecchymoses general over roof of mouth, and purpuric spots on limbs and body.		Died 12 hours after hem. began.	
Ecchymoses on roof of mouth only.		Died.	
Blood oozed at root of cord from its entire circumference; did not coagulate; coloration of urine and conjunctiva, though jaundice not noted.	Opiates and astringents internally, acetate of lead, tannin, and compression did not arrest hemorrhage even temporarily, but seemed to augment it.	Died 3 days after hem. began; anæmic.	
	Transfixure of bleeding part with needle, and including ligature; as in hare-lip.	Recovered.	
	Same as in No. 96.	Recovered.	
Hem. varied in amount from time to time; not exhaustive; from rim of navel and root of left great toe-nail, trickling slowly from minute point; region of liver hard, sensitive, and seemed to be enlarged; constipation, icterus; six days later, child cried much; ecchymoses appeared; the next day hem. from nose and mouth proving fatal.	Compress of German tinder, moistened and thickly strewn with powdered tannin, arrested hemorrhage from navel.	Died 7 days after hem. began.	
Nails markedly blue on 1st day; ecchymoses on 2d day; slight icterus on the 5th day; "otherwise felt well and even vigorous."	Compress and firm bandaging.	Recovered.	Became hydrocephalic; was imperfectly developed, morally and physically, and died with convulsions during an attack of pneumonia before the end of the second year.
Until 3d day vomited occasionally material like meconium; this day belly band was tinged with blood, apparently exuded through walls of the cord; 4th day, renewed exudation; purpurous look of left arm and back; child nursed well; 5th day, extravasations on ankles; slight icterus; 7th day, spots on back and arm looked better; general health good; icterus nearly gone; 8th day, new greenish spots in groin; clearer next day; liver dull over enlarged region; 11th day, navel cicatrized, child entirely well.	Fomentation of purpuric spots with infusion of chamomile; tr. of iron internally four times a day; no bleeding after a compress sprinkled with tannin was bound on, on the fourth day.	Recovered.	
Hem. from umbilicus and penis.	All the usual remedies.	Died 1 day after hem. began.	General anæmia; strong injection into membranous portion of urethra.

NO.	AUTHORITY AND REFERENCE.	SEX.	HEREDITARY HISTORY, CHARACTER OF LABOR, ETC.	CONDITION AT BIRTH.	DATE AFTER BIRTH WHEN	
					CORD SEP'D.	HEM. BEGAN.
102	Communicated by Dr. F. J. Bumstead, of New York.	M.	Mother healthy, but her food during gestation was poor and insufficient; a former female child had jaundice three days after birth; recovered, and died convulsed at three months; other children healthy.		5th day.	11th day.
103	Communicated by Dr. Edwards Hall, New York.	M.	Parents healthy; child unusually robust.			20th day, navel entirely healed.
104	Communicated by Dr. S. S. Purple, of New York.	M.	Parents healthy; born at full term.		3d day.	5th day.
105	Communicated by Dr. S. S. Purple, of New York.	F.	Father syphilitic.	Feeble.		6th day, cord was separated.
106	Communicated by Dr. George Benedict, S. Amboy. N. J.	M.	Parents healthy.	Healthy.	6th day.	6th day.
107	Communicated by Dr. George Benedict, S. Amboy, N. J.	F.		Healthy; born at 8th month.		8th day.
108	Communicated by Dr. J. H. Shearman, New York.		Mother feeble; had lost one child with hydrocephalus; this child born at 7th month.		7th day.	7th day.
109	Communicated by Dr. Edward Delafield, New York.					
110	Communicated by Dr. Edward Delafield, New York.					
111	Communicated by Dr. Chas. Henschel, New York.	F.				
112	Communicated by Dr. Chas. Henschel, New York.					
113	Communicated by Dr. Henry G. Cox, New York.		Mother much depressed, and had deficient diet during gestation.	Feeble.		
114	Communicated by Dr. Henry G. Cox, New York.		Mother subjected to privation during gestation.			
115	Communicated by Dr. Henry G. Cox, New York.					
116	Communicated by Dr. J. T. Metcalfe, New York.					
117	Communicated by Dr. J. T. Metcalfe, New York.					
118	Communicated by Dr. J. T. Metcalfe, New York.					
119	Communicated by Dr. J. T. Metcalfe, New York.					
120	Communicated by Hon. J. W. V., M. D.	M.	Parents healthy.	Healthy in appearance.		
121	Communicated by Hon. J. W. V., M. D.	F.	Same parents as No. 120.	Healthy in appearance.		
122	Communicated by Dr. Chas. E. Isaacs, Brooklyn, N. Y.					
123	Communicated by Dr. Chas. E. Isaacs, Brooklyn, N. Y.					
124	Communicated by Dr. Chas. E. Isaacs, Brooklyn, N. Y.					
125	Dr. C. R. Gilman, New York.					
126	Communicated by Dr. C. R. Gilman, New York City.					

SYMPTOMS.	TREATMENT.	RESULT.	AUTOPSY AND REMARKS.
Jaundiced the third day from birth, but had bilious stools; vomited blood; purpuric spots on hands; lower extremities mottled with purple; lips exsanguine; blood oozed from general surface of umbilicus; did not coagulate; after ligature hem. recurred from points of insertion of needles; convulsions.	Lint wet with tr. ferri chlor., maintained by pressure, checked hemorrhage a few hours; ligature *en masse* arrested hem. 2 days; internally, quinia, tannin, tr. ferri chlor., hydr. cum cret., with rheum.	Death 10 days after hem. began.	Surface yellow; parts about ligature deep-purple; umb. arteries open, vein closed; ductus venosus pervious, but contracted; liver of a deep-bronze color and firm; weight, 9 oz.; gall-bladder contained yellowish viscid fluid; cystic duct much contracted, but pervious; hepatic duct open; foramen ovale open to the size of a crow-quill; ductus arteriosus lined with lymph.
Strophulus the 1st week, which suddenly receded; jaundice on the 14th day, and extensive swellings, which seemed erysipelatous (?) but discharged only blood; occasional petechiæ.	No means of any service in arresting hemorrhage.	Death 3 days after hem. began.	
Jaundiced on 4th day; navel observed to be ulcerated on 5th day; severe hem. from bowels on 7th day.	Solution of tannin to ulceration, and compression with scrapings of sole leather, arrested the hemorrhage from umbilicus.	Death apparently from intestinal bleeding, 2 days after first hem.	
Jaundice and purpura, hem. from nose and mouth; emaciation.	Sulphate of copper, tannin, compression, &c.	Death 4 days after hem. began.	
	Powdered alum retained by compress and adhesive strips.	Recovery.	
Was jaundiced.	Astringents of temporary use.	Death 14 days after hem. began.	
Bled also at mouth and ears.	Compression and arg. nit. useless.	Death 3 or 4 days after hem. began.	
Jaundiced.		Death.	
		Recovery.	
	Umbilicus filled with tannin.	Death.	
	Umbilicus filled with powdered alum.	Death.	
Jaundiced.		Death.	
Jaundiced.		Death.	
Not jaundiced.	Powdered alum with pressure.	Recovery.	
Jaundiced.		Death.	
Jaundiced.		Death.	
Jaundiced.		Death.	
Jaundiced.		Death.	
	Astringents and styptics, with compression.	Death.	
	Astringents and styptics, with compression.	Death.	
Jaundiced.		Death.	
		Death.	
		Death.	
Not jaundiced.	Compression.	Recovery.	
Not jaundiced.	Compression.	Recovery.	

NO.	AUTHORITY AND REFERENCE.	SEX.	HEREDITARY HISTORY, CHARACTER OF LABOR, ETC.	CONDITION AT BIRTH.	DATE AFTER BIRTH WHEN	
					CORD SEP'D.	HEM. BEGAN.
127	Communicated by Dr. George T. Elliot, New York.					
128	Communicated by Dr. George T. Elliot, New York.					
129	Communicated by Dr. George T. Elliot, New York.					
130	Communicated by Dr. B. Fordyce Barker, New York.					
131	Communicated by Dr. B. Fordyce Barker, New York.					
132	Communicated by Dr. Joel Foster, New York.	M.		Feeble.		
133	Communicated by Dr. H. P. Dewees, New York.					
134	Communicated by Dr. J. L. Vandervoort, New York.	M.				
135	Communicated by Dr. J. L. Vandervoort, New York.	M.	Parents black.			
136	Communicated by Dr. J. S. Thebaud, New York.	M.			6th day.	6th day.
137	Communicated by Dr. E. T. Winter, New York.				6th day.	13th day.
138	Communicated by Dr. A. Gescheidt, New York.	M.	Parents healthy.	Feeble.	8th day.	8th day.
139	Communicated by Dr. F. A. Thomas, New York.		Mother, a dark mulatto, healthy.	Healthy; a light mulatto.	7th day.	7th day.
140	Communicated by Dr. E. L. Beadle, New York.	M.	Parents healthy and free from any constitutional taint; no tendency to hem. in family.	Healthy in appearance.		"Soon after birth."
141	Communicated by Dr. A. K. Gardner, New York.	F.	Mother a prostitute; had secondary syphilis.			
142	Communicated by Dr. A. K. Gardner, New York.		Mother syphilitic.	Covered with large blebs containing pus.		2d day.
143	Communicated by Dr. B. R. Masters, New York.	M.	No syphilitic or scrofulous taint in either parent; mother anæmic at time of confinement; had suffered much from nausea, diarrhœa, and mental depression during gestation; labor protracted 16 hours.	Thin, small, and weak.		2d day.
144	Communicated by Dr. B. R. Masters, New York.	F.	No constitutional taint in either parent; mother had suffered much from vomiting, constipation, &c., during gestation, but seemed in good health at the time of labor; labor tedious, 15 hours.	Plump, weight 11 lbs.; veins of cord, large, dark, and full, and their walls thin.		3½ hours after birth.

SYMPTOMS.	TREATMENT.	RESULT.	AUTOPSY AND REMARKS.
	Styptics, compression, ligature *en masse*.	Death.	
	Styptics, compression, and filling umbilical depression with fluid plaster of Paris.	Death.	
	Styptics and compression.	Death.	
	Powdered matico and pressure partially successful; plaster of Paris completely so, in checking hem.	Recovery.	
	Powdered matico and pressure partially successful; fluid plaster of Paris filling umb. completely so.	Recovery.	
Jaundice; ecchymoses.	Ligature *en masse* stopped hemorrhage.	Death.	
	Alum and powdered ergot unsuccessful; conical plug of cork with compression stopped hem.	Recovery.	
Jaundiced.		Death 24 hours after hem. began.	
		Death 2 days after hem. began.	
	Compress and adhesive strap.	Recovery.	
Surface yellow.	Alum and argent. nit. useless; filled navel with tannin, and put over it a compress spread with moist tannin.	Recovery.	
Jaundiced two days after birth.	Astringents, styptics, compression, ligature *en masse*.	Death 48 hours after hem. began.	
	Astringents, nitrate of silver, and compression.	Death 7 days after hem. began.	
Hem. at first from divided end of cord, afterwards from around its insertion.		Death 2 or 3 days after hem. began.	
Hem. from the attachment of the funis to the body; child had also gonorrhœal ophthalmia.	Compressing cord with large ligature of cotton wicking, sprinkled with powdered catechu.	Death 2 or 3 days after birth.	
Hem. from cord.		Death.	
Pale blood noticed first on band; jaundice on third day; hem. in diminished quantity; no purpura.	Ligature to umbilicus, cloths wet with astringent solutions to abdomen, and internally elixir vitriol.	Death on the 5th day from birth.	Mother had metritis on fifth day; recovered.
Pale blood exuded from the walls of the cord; 5½ hours after birth purpuric spots appeared on skin; 6½ hours after birth frothy serum and blood issued from mouth and nostrils.	Ligature on cord at its insertion, with bandage about funis; internally, brandy.	Death 7 hours from birth, 3½ from 1st hem.	

NO.	AUTHORITY AND REFERENCE.	SEX.	HEREDITARY HISTORY, CHARACTER OF LABOR, ETC.	CONDITION AT BIRTH.	DATE AFTER BIRTH WHEN	
					CORD SEP'D.	HEM. BEGAN.
145	Communicated by Dr. Chas. Hooker, New Haven, Ct.	F.	Mother had intense thirst during pregnancy, and drank largely.	Not wakeful and bright, but lay in a sub-comatose condition with generally stertorous breathing.	5th day.	5th day.
146	Communicated by Dr. Chas. Hooker, New Haven, Ct.	M.				
147	Communicated by Dr. Chas. Hooker, case of Dr. George A. Moody, Plainville, Ct.		Mother had an intolerable thirst during pregnancy.		5th day.	15th day.
148	Communicated by Dr. H. W. Dean, Rochester, N. Y.	F.	Parents appear to be perfectly healthy.	Good; weight 8 lbs.		8 weeks.
149	Communicated by Dr. H. W. Dean, Rochester, N. Y.	M.	Parents healthy.	Weighed 9¼ lbs.; appeared perfectly healthy.		
150	Communicated by Dr. H. W. Dean, Rochester, N. Y.	F.	Same parents as Nos. 149 & 151.	Weight 7½ lbs.		21st day.
151	Communicated by Dr. H. W. Dean, Rochester, N. Y.	M.	Same parents as Nos. 149 & 150; a later child died of purpura and icterus without umb. hem.	Weight 9½ lbs.		
152	Communicated by Dr. S. Barrett, Le Roy, N. Y.	M.	Mother scrofulous.	Healthy in appearance; average size.	7th day.	8th day.
153	Communicated by Dr. S. Barrett, Le Roy, N. Y.	F.	Mother healthy.	Pale and delicate.	8th day.	6th day.
154	Communicated by Dr. S. Barrett, Le Roy, N. Y.	M.			6th day.	7th day.
155	Communicated by Dr. P. C. Samson, Syracuse, N. Y.	M.	Twins; father has since died of cancer of the face; mother healthy, as was father at the time.	Apparently healthy.		48 hours after birth.
156		M.				
157	Communicated by Dr. C. V. W. Burton, Lansingburgh, N. Y.	M.	Parents rather delicate, but without scrofulous or syphilitic taint.	Healthy.	5th day.	5th day.
158	Communicated by Dr. A. J. Skilton, Troy, N. Y.		Parents healthy.			
159	Communicated by Dr. A. J. Skilton, Troy, N. Y.		Same parents as No. 158.			
160	Communicated by Dr. P. Stewart, Peekskill, N. Y.	F.	Mother of feeble constitution and scrofulous tendencies.	Healthy.	5th day.	5th day.
161	Communicated by Dr. Henry C. Gray, North White Creek, N. Y.	M.	Parents healthy.	Healthy.	5th day.	5th day.
162	Communicated by Dr. James H. Pooley. Dobb's Ferry, N. Y.	M.	Parents healthy.	Healthy and large.	"At the usual time."	7th day.
163	Communicated by Dr. James H. Pooley, Dobb's Ferry, N. Y.	M.	Healthy.	Healthy.		

SYMPTOMS.	TREATMENT.	RESULT.	AUTOPSY AND REMARKS.
Jaundiced on the 2d day; effusion of blood under scalp on 4th day; roof of mouth ecchymosed, and purpuric spots on limbs and trunk; occasional slight oozing from umb. after falling of the cord; stools tarry; 7th day profound coma relieved by puncture of tumor of scalp.		Death 3 days after hem. began. Recovery.	
Skin yellow; stools clay-colored; bloody discharges from bowels; purpuric spots on skin.		Death 3 days after hem. began.	
Icterus, at end of six weeks, accompanied by nausea; four days later, purpuric spots; and, later still, blood in stools, urine, and ejecta of stomach; emaciation; spoon made mouth bleed; 14 days after illness began, hem. from umbilicus.	Hydr. cum creta and rheum, for jaundice; tr. ferri mur.	Death 3 or 4 days after umbilical hem. began.	
Jaundiced on the 2d day; refused to nurse; bleeding from the margin of the umbilicus; stools natural.		Death on the morning of the 4th day.	Liver normal in appearance; cystic and hepatic ducts impervious.
Jaundiced when one week old; purpura of skin, and hem. from umbilicus, mouth, and bowels, at the age of 3 weeks.		Death 14 days after hem. began.	
Very similar to those of case 149.		Death at 3 days from birth.	After death of child, nursed a friend's child which grew fat and strong on her milk.
Oozing from spongy surface of umbilicus; no jaundice or purpura; hem. continued ten days.	Compression, with alum and tannin; internally, 2 drops acidi sulph. aromat. each 3 hours; mother also took acid as she flowed freely.	Recovery.	
Hem. from the bladder for 4 or 5 days, which ceased when the hem. began from umbilicus.	Compression with alum. Various styptics.	Recovery. Death 5 days after hem. began.	
Rapid venous hem. from whole circumference of cord at root; no jaundice or purpura.	Graduated compress, and astringents.	Death 24 hours after hem. began.	Nephew of mother had hemorrhage from neck, at age of 14, requiring ligature.
Hem. per saltum on falling of cord; jaundice on 3d day; no purpura.	Astringents and styptics; ligature *en masse;* allowed the needle to drop off with eschar.	Recovery. Died 2 or 3 days after birth. Died 3 days after hem. began.	
Supposed to have lost a pint of blood (?) in two days.	Treatment first 2 days not reported; powdered nutgall, and a hard compress, arrested hemorrhage.	Death in 2 weeks from exhaustion.	
Continued dribbling; no jaundice or purpura.	Astringents, compression, cold, arg. nit., and actual cautery.	Died 6 days after hem. began.	
Jaundice three or four days after birth.	"Usual styptics," pressure, and cold water.	Death 3 days from 1st hem.	
Jaundice.		Death.	

NO.	AUTHORITY AND REFERENCE.	SEX.	HEREDITARY HISTORY, CHARACTER OF LABOR, ETC.	CONDITION AT BIRTH.	DATE AFTER BIRTH WHEN	
					CORD SEP'D.	HEM. BEGAN.
164	Communicated by Dr. G. C. Monell, Omaha, Nebraska.	M.	Healthy; mother always flowed largely at delivery.	Healthy.		12 hours.
165	Communicated by Dr. J. H. Reynolds, Wilton, Saratoga County, N. Y.	F.	Mother delicate but healthy; not slightest scrofulous or syphilitic taint in parents.	Healthy.	5th day.	3d day.
166	Communicated by Dr. A. L. Saunders, Brookfield, Madison County, N. Y.	M.	Parents healthy; no scrofulous or syphilitic taint; no hemorrhagic tendency in family.	Apparently healthy; weighed 11½ lbs.	4th day, umb. healed.	9th day.
167	Communicated by Dr. Wm. Wood, East Windsor Hill, Ct.	F.	Parents perfectly healthy; no hemorrhagic tendency in family.	Healthy.	4th day.	14th day.
168	Communicated by Dr. Elisha P. Fearing, Nantucket, Massachusetts.	F.	Father healthy; mother scrofulous; other children (six) scrofulous.	Apparently healthy.	9th day.	10th day.
169	Communicated by Dr. Elisha P. Fearing, Nantucket, Massachusetts.	F.	Phthisical tendency in family; two other children have died of pulmonary maladies.		5th day.	6th day.
170	Communicated by Dr. S. H. Dickson, Charleston, S. C.	F.	Parents healthy; father old; mother quite young; no hemorrhagic tendency transmitted.	Hardly viable; born at less than 7 months.	8th day.	5th day.
171 172 173 174	Communicated by Dr. D. McRuer, Bangor, Me.		Parents of two healthy; mothers of other two not; one died of phthisis, the other of cancer, within a year.			In all the cases immediately after the separation of the cord.
175	Communicated by Dr. D. McRuer, Bangor, Me.	M.	Parents healthy; no hereditary tendency to hemorrhage.			
176	Communicated by Dr. Simon Whitney, Framingham, Mass.	F.	A year later parents were syphilitic; *probably* so at time of birth; labor easy.	Apparently healthy.	6th day.	6th day.
177	Communicated by Dr. John Watson, New York.		Mother healthy, and had several healthy children; did not flow unusually after labor; has since lost another child from the same cause.	Apparently healthy; large and florid; had no jaundice.		30 hours after birth.
178	Author.	M.	Parents healthy; labor short and easy; first child.	Small.	6th day.	7th day.

SYMPTOMS.	TREATMENT.	RESULT.	AUTOPSY AND REMARKS.
Oozed steadily from whole circumference of cord at root; no purpura.	Alum, compression, caustics.	Death 12 hours after hem. began.	
Hem. venous; no jaundice.	Powdered starch and gum Arabic, with compress.	Death 2 days after hem. began.	
Blood oozed as from a sponge from whole circumference of navel; did not coagulate and was thin; no purpura; extension of legs caused pain, also compression, which also excited spasm.	Astringents and compression.	Death 21 hours after hem. began.	Slight yellowness *after death.*
	Astringents and cautery.	Death in a few hours after hem. began.	
First day, slight; next day, alarmingly profuse; no jaundice or purpura.	Compress and bandage; then ligature under needles crossed at right angles through skin and cellular tissue; effectual; internally, brandy.	Recovery; though hydrocephalic for many months.	
	Ligature of vessels and cellular tissue.	Death at 4 weeks, from bleeding at mouth; no umb. hem. after ligature.	
Oozing around the insertion of the cord; no jaundice, or purpura.	Pressure, styptics, and ligature.	Death 1 day after hem. began.	
Purpura in two cases; jaundice in two, observable 48 hours after birth; one lived 3 mos., bleeding at intervals of from 4 to 8 days. This one had, after 4 weeks, a fungoid growth at the umb. orifice, from which blood oozed.	Astringents, compression, and in the case having fungus, caustics to it.	Death in all the cases.	
	Dr. J. M. Sims' clamp suture, passing the wires beyond the ring, and drawing forward the umbilicus, care taken not to strangle integument embraced by clamps completely; clamps remained in situ 16 days; internally two drops tr. ferri chlor. each 4 hours, and a robust wet nurse was provided.	Recovery.	
Jaundice on 3d day after birth; hem. very free at times; subsequently bled from mouth.	Tannin, zinci sulph., alum, useless; arg. nit., with compression, stopped it at navel.	Death 7 days after hem. began.	
The first hem. was a few drops from the string; was renewed early on the second day; was checked a few hours by remedies.	Argent. nit. and sugar of lead and alum.	Death 33 hours after hem. began.	
Colicky pains for 36 hr's; jaundiced on the 2d day; vomited blood on the 7th day; same day blood oozed steadily from the umbilicus. Only temporarily restrained by remedies.	Cold; conoidal compress, saturated with strong solution of alum, retained by bandage.	Death 16 hours from com. of hem	

An examination of the preceding histories and tabular analysis shows the existence of two varieties of the form of umbilical hemorrhage under discussion.

First, and most common, that depending on a depraved condition of the blood, the spanæmia resulting sometimes from jaundice, through malformation, or deranged function of the liver, sometimes from an inherited scrofulous or syphilitic taint, and probably not unfrequently from privation and despondency in the mother during gestation, or during the same period an excessive use of alkalies or diluent fluids.

Second. Independently of any dyscrasia of the blood, umbilical hemorrhage seems to arise by reason of an unusual patency of the umbilical vessels, in otherwise apparently healthy children.

These two conditions of the hemorrhagic flow are doubtless often associated, but that the second exists sometimes exclusively, may not be questioned.

Proceeding with the discussion of the general subject before us, we encounter *in limine*, queries as to the causes of this hemorrhage.

ETIOLOGY.—It is apparent that any influence which affects the normal plasticity or coagulability of the blood, may act as a predisposing cause of hemorrhage. An existing predisposition to hemorrhage is the more likely to be followed by its occurrence in so far as the mechanical obstacles which ordinarily impede it cease to exist.

What then are the normal conditions of the obliteration of the umbilical vessels? On the 5th or 6th day after birth the cord generally falls, leaving frequently a slight ulceration at its root, which is succeeded by firm cicatrization about the 10th day. A few hours after birth a coagulum begins to form in the outer extremity of the umbilical arteries. It is adequate as a temporary plug to restrain bleeding from the arteries, until the permanent occlusion of the vessels, which is effected about the 25th day.[1] Any

[1] This statement is established by the researches in 1852, at the *Enfans Trouvés*, of M. Lorain, whom Roger, in his aforementioned memoir, styles a "distinguished hospital student." They pertain to the physiology and pathology of the cord and umbilical vessels. I quote the following concerning the obliteration of the umbilical arteries, adopting the translation of Dr. George A. Otis. (*Virginia Medical and Surgical Journal*, Oct., 1853, p. 57.) "There are two modes of obliteration: in the first, the obliteration is provisional; it suffices for the present necessities of the new-born child, and guards against early accidents; it consists in a clot which

influence then which retards or prevents the formation of this coagulum, or even which displaces it, is likely to lead to hemorrhage, to which may be added any cause deteriorating the healthy constitution of the blood. Some of these influences are: 1. Malformation of the liver and its deranged function, resulting in jaundice. It is a well established fact that in almost all cases of jaundice the blood becomes much impoverished, the globules and the fibrin falling below their natural standard, and that, consequent on this impoverished state of the blood, a general disposition to hemorrhage very commonly exists. With diminished fibrin, the salts of the blood are in excess.[1] Such cases, then, as Nos. 2, 18, 20, 49, and 149, where there was occlusion or constriction of the hepatic or common duct of the liver, or as Nos. 34, 47, and 102, in which jaundice probably resulted from the functional derangement of its secreting tissue, present a condition of the blood little favorable to early coagulation. 2. A spanæmic condition of the blood is often induced by excessive drinking of diluent fluids, manifesting itself by dropsical effusion, and by purpuric eruption under the skin and mucous membranes, and by hemorrhages from the gums, stomach,

forms a few hours after birth. This coagulum is found in children who have not lived more than four or five hours; it commences sometimes in the arteries of the cord, and sometimes at the junction of these vessels with those of the abdomen; it is black, of mediocre consistence, adhering but slightly to the walls of the artery, and is at first very short; subsequently it is elongated by the successive deposition of new molecules, until, at the end of the second day, it occupies two-thirds or half the length of the artery, commencing at the umbilicus. It is then firmer, denser, and more adherent to the walls of the vessel. During the succeeding days this coagulum acquires greater consistence, and loses, at the same time, its black color, and assumes a fibrinous aspect; it becomes more and more regularly cylindrical. In proportion, as the clot contracts, the artery narrows. This may be called the provisional mode of obliteration.

"The other consists in the complete occlusion of the artery at its umbilical extremity, an occlusion which occurs in the following manner: the extremity of the artery is retracted from the navel, contracts and presents a conical extremity; this hardly takes place before the twenty-fifth or thirtieth day; at this date the calibre of the artery is very small, and is occupied by a fibrinous clot, white, dense, regularly cylindrical, and closely adherent to the arterial coats. This is the true obliteration. When Billard speaks of the vessels being obliterated on the fifth day, he does not explain what he means by this occlusion, the mechanism of which he seems to have entirely misunderstood."

[1] Budd, Diseases of the Liver, 3d edition, London, 1857, pp. 337, 472, 473. Monneret, Archives Générales de Médecine, June, 1854, p. 64, *et seq.* Prof. Lebert, of Zurich, on Typhoid Icterus, Vierteljahrschrift, No. 1, 1856, Prague. Simon, Animal Chemistry, Sydenham Society's edition, 1845, p. 330.

bowels, &c. When this polydipsia is indulged during pregnancy, the blood of the infant is equally dilute with its mother's, alike void of plastic elements. Nos. 93, 94, 145, and 147, are instances illustrating this source of blood impoverishment.

Dr. Charles Hooker, of New Haven, Ct., in a Report on the Diet of the Sick, made to this Association in 1855,[1] adduced excessive drinking of water as a prominent cause of *purpura hemorrhagica*, and in a recent private communication to the writer enforces the same opinion. While all cases of umbilical bleeding in infants are not complicated with purpura (20⅓ per cent. only of the cases of umbilical hemorrhage in my table having, so far as noted, exhibited petechiæ, ecchymoses, or other sign of its presence), we cannot doubt that bleeding at the navel and purpuric eruption, are alike, often, but symptoms of general blood disease.

It is desirable that inquiry be made concerning the excessive indulgence of thirst during pregnancy, or the contrary fact, in future observations of bleeding at the navel.

3. An impaired quality of the infantile blood is doubtless often due to an inherited scrofulous or syphilitic taint. One or both parents of Nos. 152, 160, 168, and 169, of the tabulated cases, were scrofulous or phthisical; of Nos. 63, 67, 105, 141, and 142, syphilitic.

4. It has been noticed[2] that an excessive use of alkalies by pregnant women for dyspepsia, or other conditions, renders them peculiarly liable to hemorrhage after parturition. The child is not likely to have more plastic blood than its mother.

5. Insufficient food, privation, and depression of spirits, during gestation, can hardly fail to impair the healthy quality of the blood of both the mother and her offspring. Nos. 102, 113, 114, and 143, were children of mothers thus unfortunate.

6. Arrest from whatever cause of the fœtal development of the liver, by impairing its blood-making qualities,[3] is very likely to induce spanæmia.

7. A diseased condition of the umbilical vessels, the result of their inflammation, is undoubtedly a cause of hemorrhage from the navel. Roger, in his memoir before referred to (Mars 26, 1853, p. 142), considers that umbilical *arteritis* is a frequent cause, that "the

[1] Transactions, vol. viii. p. 451.

[2] Dr. M. S. Perry, cited by Dr. Minot (*loco cit.*, p. 319).

[3] Prof. E. R. Peaslee, American Medical Monthly, May, 1854, p. 343.

want of obliteration, of which the hemorrhage is the consequence, is due to this alteration of the artery," and that "the dilated, friable, and ulcerated arterial vessels cannot retract and oppose the outflow of blood from the umbilicus." Prof. Simpson also states[1] that secondary hemorrhage from the umbilicus is frequently combined locally with deposits and disease in the walls of the umbilical vessels.

Hereditary transmission of the hemorrhagic predisposition may be inferred from nine cases [Nos. 6, 9, 10, 11, 12, 32, 33, 34, and 164], in which the mothers had been liable to profuse menorrhagia, excessive bleeding after labor or injuries, or when there was other evidence of a hemorrhagic tendency in the family [No. 6], as well as from the fact that 17 other mothers, in whom no hemorrhagic tendency was apparent, bore more than one child which bled at the navel. [Mothers of Nos. 3, 4, 5, 9, 10, 11, 12, 19, 20, 24, 25, 32, 33, 34, 35, 36, 37, 38, 46, 47, 52, 53, 56, 57, 61, 62, 74, 75, 99, 100, 149, 150, 151, 155, 156, 158, 159, 177, and one not in the table, thirty-nine children.]

Despite the hereditary bequeathal of this disease as thus evinced, I have been surprised to notice, that of families known as "bleeders," where the slightest injuries often induce serious hemorrhage, scarce any record exists of infantile umbilical bleeding, the case reported by Dr. Elssaesser [No. 6], in which, however, the parents and grandparents are reported as healthy, being the only one in the table.

To determine how far the mother's imagination or emotions during pregnancy can influence the condition of her offspring, will require a more extended array of facts than we at present possess. In this connection, Dr. Minot pertinently gives the following extracts from a letter of Dr. S. S. Whipple, communicating a fatal case of the disease in a child of robust parents. "I will mention a single coincidence in the case, which must be taken for what it is worth.

"Some time in the latter months of pregnancy, a female friend told the mother to be sure and caution her attendants about the navel, as a friend of hers had had much trouble from carelessness of a like kind. She said she had felt greater solicitude from that time; the description of the bleeding child gave her feelings some-

[1] Obstetric Works, American edition, vol. ii. p. 423, and Edinburgh Monthly Journal of Medical Science, July, 1847.

thing of a shock, and she was frequently heard to speak of the circumstance to the nurse before her confinement."

In this disease is seen another proof of the greater proneness of males over females to hemorrhagic fluxes. Of 111 cases in which the sex is noted, 73 or 65¾ per cent. are males, and but 38 or 34¼ per cent. females. The disproportion, however, between the sexes is not so great as in Grandidier's statistical summary of 54 families of "bleeders."[1]

There are not data sufficient to enable us to judge of any influence, exerted by climate or race, on the production of this malady. Well marked instances are recorded of its existence in England, Ireland, Scotland, the East Indies, France, Germany, and in the United States, the negro and mulatto sharing in common with the white, a liability to its invasion.

Though, in many instances, the broken health of the parents does undoubtedly induce this hemorrhage, the malady cannot, in a majority of cases, be *traced* to parental disease. Of 87 cases, where the health of one or both parents was noted, 51, or 58.6 *per cent.*, were in good health.

Still less to tedious or difficult labor does umbilical hemorrhage owe its existence. But two instances of its occurrence, thus complicated, are noted among 26 cases in which the character of the labor is recorded.

External violence may be promotive of hemorrhage from the navel, by displacing the provisional clot, before the permanent occlusion of the umbilical arteries.

Symptoms and Course of the Disease.—Generally there is no premonitory indication of its fearful coming. In a very few instances colicky pains have been noticed, preceding the hemorrhage, and in an equally small number, vomiting. The signs of an unnatural condition of the liver, as constipation, light, white, or clay-colored stools, urine deeply stained with bile, and a yellow skin, more frequently precede the hemorrhage. Thus, jaundice was evident in more than 23 per cent. of the tabulated cases [41 in 178], *before* there was any appearance of hemorrhage. Purpura, though a complication in one-fifth of the cases, *preceded* the umbilical hemorrhage scarcely half as often, manifesting itself in ecchy-

[1] There were 320 children in these families, 197 males, 123 females. 154 males, and only 17 females, were affected with hemorrhages.—*Die Hämophilie, oder die Bluterkrankheit.* Leipzig, 1855, p. 97.

moses, vomiting of blood, or its escape by stool, in but 9.6 per cent. of all the cases (17). Though a precursor of hemorrhage, in but 41 cases, jaundice was noted as existing during its course in 77 or 43½ per cent. of all the cases reported. From the imperfect manner in which some of the histories are furnished, it is probable that a still higher percentage would obtain in more fully recorded observations. Purpura was present at some stage of the malady, frequently in varied manifestations, in 36 cases, or in 20⅓ per cent. of all reported cases.

Time of commencement of hemorrhage.—Though, in a great majority of cases, bleeding does not commence until the separation of the cord, the exceptions are numerous. In more than 27 per cent. (31 cases out of 113 in which the circumstance is noted), the bleeding took place from the walls, or at the insertion of the funis, before the completion of the physiological process of desiccation. Of cases where the bleeding followed the separation of the cord in 22 out of 82, or nearly 27 per cent., it occurred on the same day, not unfrequently immediately succeeding it. Hemorrhage commenced, on an average in 102 cases, on the 8th day. Of these cases bleeding commenced in the first week after birth in 56, during the second week in 39, and in 7 during the third week. In one case, No. 144, bleeding was apparent in 3½ hours after birth. In another, No. 148, only at the termination of 8 weeks. The period of hemorrhage in this case, for obvious reasons, was not included in the summary, from which the average date of hemorrhage after birth was derived.

The character of the hemorrhage is variously described. The phrases "steady oozing," "slight oozing," "oozing of bloody serum," "exudation of pale blood," describe one group of cases, or more accurately, the commencement of most. "Rapid venous hemorrhage," "hemorrhage *per saltum*," "continual dribbling," "hemorrhage very free," "hemorrhage alarmingly profuse," mark the beginning of some cases, and an advanced condition of others. The hemorrhage is both venous and arterial. The evidence inclines to the belief that it is more frequently arterial than venous. In 12 cases, in which the autopsies showed clots or fluid blood in the umbilical vessels, they were found in the arteries alone 7 times, in the veins alone twice, and in both the arteries and veins 3 times. In 15 autopsies, in which reference is made to the state of the vessels, one or both umbilical arteries were found pervious in 12 cases. In two they were closed, and their condition in one is not noted

The same cases displayed the vein open in eight cases, in three it was closed, in one, nearly obliterated, in one, collapsed, but not obliterated, in one, empty and contracted, and in one, its condition was not noted. The want of the arterial jet (noticed only twice, Nos. 61, 157), probably "depends rather upon the anatomical disposition of the parts, the arteries either containing a half-formed coagulum, which deadens the remote impulsion of the heart, or else being retracted within the abdomen, and thus leaving an interval between their open extremities and the umbilical orifice."[1] The difficulty of distinguishing its source, by the appearance of the blood, is increased by the occasional patency of the other fœtal openings, which allows admixture of the venous and arterial blood. The blood is thin, pale, and non-coagulable, in a large proportion of cases. It is not often that the blood can be seen to issue from a distinct orifice. More frequently it exudes from the walls of the cord, or percolates from an ulceration about its insertion, or wells up from granulations at the bottom or side of the navel.

Duration of the hemorrhage.—The average duration of the disease, after the appearance of hemorrhage, in 82 fatal cases, was 3½ days. Death has occurred as early as three hours from the beginning of hemorrhage (No. 144), while life has been prolonged 38 days thereafter, No. 23.[2] When speedily fatal death seems most often to result from exhaustion from loss of blood, or the fatal issue may be deferred to be but later attended by purpura, œdema, diarrhœa, *muguet*, or other signs of exhaustion. It is not strange that coma or convulsion complicated six cases (Nos. 31, 72, 82, 87, 102, and 145).

PATHOLOGICAL ANATOMY.—This has been sought for less often than is desirable. But 22 cases are noted in which any examination after death was made, and in some of these it was very incomplete. Attention was very naturally drawn most frequently to the liver and umbilical vessels. The liver was examined 15 times. No peculiarity was constant. Its color was noted 13 times. In 4 cases it was natural; in 2, lighter; and in 7, darker than its normal hue. Its density is reported as firm, soft, and normal, alike in 3

[1] Dr. George A. Otis, Virg. Med. and Surg. Journ., Oct., 1853, p. 60.

[2] A correspondent informs me of the exceptional case of a young lady, æt. 18, who at intervals is still subject to hemorrhage from the umbilicus, the ulcerated surface of which, after the separation of the cord, never cicatrized. The aspect of this patient is anæmic, though her health is generally pretty good.

cases. Its size as large 4 times, and natural 5 times. In 4 cases it was congested, and in one, full of dark bile. In this case the excretory ducts of liver and gall-bladder were wholly absent. The condition of the hepatic and cystic ducts attracted attention 11 times. In 7 cases they were absent, impervious, or obstructed. In 4, open. The gall-bladder was also 11 times the subject of notice. In but two instances has it been found to contain ordinary bile, often it has been found to contain, especially when an impervious condition of the ducts exists, a light, serous fluid, amber-colored or greenish. Out of 16 cases, where observation was made of the condition of the umbilical vessels, one or more of them was found open in 14 cases. In one case they were all closed, and in one (44), the report is not definite. Of the other fœtal openings the foramen ovale was open 7 times, and closed once. The ductus arteriosus was open 5 times, closed 3 times. The ductus venosus was open 3 times, closed twice.

A yellowness of the internal organs (except the liver and spleen), was noticed twice. Twice there was submucous hemorrhage in the intestines, twice ecchymosis of the lungs. In one case the stomach was ecchymosed, and in another case the stomach and intestines contained blood in considerable quantity. Twice the spleen was soft. In another case it was of a dark purple color. Effusion of blood in the lateral ventricles, and under the arachnoid, existed in one case, and in one case effused serum from pericarditis. The condition of the blood, elsewhere than in the umbilical vessels, was noted in 5 cases, in all of which it was fluid.

From the above *résumé* of pathological appearances in those victims of umbilical hemorrhage which have come under notice, may be inferred: 1st, a great frequency of hepatic malformation or derangement in this disorder; and 2dly, an equal frequency of perviousness in some of the umbilical vessels, or other fœtal openings. How far these conditions have relation to each other as cause and effect, pathological facts, from their fewness, are not decisive. In the 7 cases in which there was absence or obstruction of the ducts, the umbilical vessels were open in three. In one the vein alone was open, and in three the condition of the vessels is not noted. An impediment to the passage of bile into the duodenum is not, however, essential to the maintenance of patency of the fœtal openings, as shown in case No. 34. How far the imperfect secretion of bile from the blood may be a cause, observation does not teach us. Hitherto no microscopic examination of the

liver as to the extent of diminution of its secreting cells seems to have been made.

DIAGNOSIS.—The diagnosis of this affection is easy. The frequent shrinking of the funis after its ligation, sometimes causes hemorrhage. The accidental bleeding is most likely to be confounded with those cases (90, 140) of the malady under consideration, in which hemorrhage first appears at the cut end of the cord. The mistake of confounding hemorrhage from avulsion of the cord, with that from constitutional causes, is not likely to be often made. In the early stages of the malady its diagnosis may often be assisted by noting the presence of the phenomena of icterus or purpura.

PROGNOSIS.—This is fearfully grave. Five-sixths (83.7 per cent.) of those attacked succumb to the disease or its sequelæ (149 out of 178). Though umbilical bleeding be stayed, the child often dies of exhaustion, or by reason of the severity of the constitutional disease, of which the bleeding was only symptomatic. Complication with jaundice is perhaps the most serious, as we have seen it is the most common association. 43¼ per cent. of all the cases observed (77 in 178) are known to have manifested icteric symptoms, and of those so affected, 93½ per cent. (72 in 77) died. On the other hand, while but 7.7 per cent. (6 in 77) of those having jaundice recovered; of all those recovering, 79⅓ per cent. (23 in 29) had no jaundice.

Purpura, which, as we have seen, is in nearly one-half of the cases of jaundice complicating umbilical hemorrhage, associated with it, is of equally grave import, denoting a want of plasticity in the blood. The cases most likely to recover are those of the healthy children of healthy parents, having no dyscratic taint, in whom jaundice or purpura are not seen, and in whom hemorrhage has only come on after the separation of the cord.

TREATMENT.—To be efficient the treatment of umbilical hemorrhage must be undertaken early, and conducted without temporizing expedients. To rely on compression, or styptics, or caustics (even the *ferrum candens* is useless), will generally be a fatal step.[1] The

[1] Though a majority of the whole number of recoveries has succeeded to compression, sometimes associated with astringents or styptics, much the greater part of the infants thus saved had presented no signs of jaundice, purpura, or constitutional dyscrasia. In such cases one is justified in resorting primarily to this method for arresting the hemorrhage.

ordinary hemostatics are of little benefit, even if they do not, as seems to be the case, sometimes increase the bleeding. The nitrate of silver is unquestionably injurious, except when combined with pressure. Filling the umbilical depression with fluid plaster of Paris, as recommended by Dr. Churchill, has proved successful in three cases, but is not a reliable resource. Cutting down upon the bleeding vessels in order to tie them, is a difficult operation, which has never been successfully performed, and from the hemorrhagic tendency in subjects of the disease, one of considerable danger from loss of blood. Great encouragement has thus far resulted from the adoption of the ligature *en masse*, as recommended by M. Paul Dubois. He gives the following rules for its application. "The child should be placed on a table of convenient height, its back resting on a pillow, in order that the abdomen may be prominent; two assistants should confine its limbs. The operator commences by transfixing horizontally the *integuments* (not the whole thickness of the abdominal walls) with a hare-lip needle at the base of the umbilicus; another needle is inserted perpendicularly to the first, and beneath it. Then several turns in figure of 8 with a waxed thread, are to be made around each needle. The needles may be removed on the 4th or 5th day; but the eschar should be allowed to fall of itself, and nothing should be done to hasten its separation."[1]

This operation is easily performed, is of slight risk, and for the time, will generally arrest the hemorrhage. It better than anything else, affords time for correcting the depraved condition of the blood by internal medication.

This mode of relief has been too little resorted to in umbilical hemorrhage. Where jaundice appears in the newly-born it seems but prudent to avert, if may be, a possibly impending hemorrhage, by remedies addressed to the hepatic gland, always keeping in view the malformation, which may render all medication null. In cases where there had been *any* secretion of bile since birth, I should not hesitate to employ mercurials despite their anti-plastic influence on the blood. The mineral acids, the *Tr. ferri chloridi* and the sulphate of quinine, would seem in many cases also to be indicated. The table of cases affords noteworthy testimony to the efficacy, especially of the mineral acids, and of preparations of iron. Anodynes, too, are sometimes useful in allaying spasmodic muscular

[1] Translation of Dr. George A. Otis, Virg. Med. and Surg. Journ., Oct., 1853, p. 63.

action which occasionally seems to aggravate the bleeding. Nourishing food and stimulants to maintain the strength, are also indicated. I can but believe that a less exclusive reliance on direct efforts to stop the hemorrhagic flow, would have led to more favorable results in these 178 cases than the recovery of 16.3 per cent. The combination of an early application of the ligature *en masse*, with appropriate internal medication would, I think, lessen essentially the mortality, as exhibited in the table, on which the foregoing analyses are based. With regard to the prophylaxis of the disease, I quote from Dr. Minot's comprehensive essay, the suggestion of Dr. Perry, before alluded to. "I am indebted to Dr. M. S. Perry for a valuable suggestion concerning the prophylactic treatment to be employed by women who have already given birth to children, with the hemorrhagic diathesis, when again pregnant. Observing that women, accustomed to take alkalies in considerable quantities during pregnancy, for dyspeptic or other symptoms, were peculiarly liable to hemorrhage after parturition, he has been in the habit of interdicting such remedies, and of substituting for them the mineral acids, with very satisfactory results. Dr. Perry suggests that the use of the mineral acids, during pregnancy, by women whose children have been affected with umbilical hemorrhage, might be followed by favorable results; the experiment is worth trying." I am not aware that it has ever been instituted.

I am not willing to close this report, without acknowledging the courtesy which has in so many instances aided me in its progress. To all the gentlemen who have afforded me material relating to my theme, my cordial thanks are rendered, and especially are they due to Dr. Francis Minot, of Boston, whose table of cases, unfortunately unpublished with his essay, was placed at my disposal. I am happy too to acknowledge my obligation to Dr. Wm. F. Holcomb, of New York, and to Drs. Edmund Arnold and Max. Reinfelder, of Yonkers, for valuable assistance in translation from the German.

J. FOSTER JENKINS.

REPORT

ON

INFLUENCE OF MARRIAGES OF CONSANGUINITY

UPON

OFFSPRING.

BY

S. M. BEMISS, M.D.,

LOUISVILLE, KY.

REPORT ON INFLUENCE OF MARRIAGES OF CONSANGUINITY UPON OFFSPRING.

Is the offspring of marriages of consanguinity equal physically and mentally to the offspring of parents not connected by ties of blood—both classes being supposed to be similarly circumstanced in respect to all other causes affecting the integrity of their issue?

A question of similar import to this has at times engaged popular attention probably for many ages, and yet no facts have hitherto been collected of sufficient number and authenticity to determine its solution. This neglect to accumulate statistical testimony as to the results of family intermarriage could not have proceeded from paucity of material, since, not only do the pages of history teem with instances of such marriage, but they are found in almost every social circle, and should receive the earnest scrutiny of physiologists. Surely, no questions can concern us more closely than those which relate to the prevention of the numerous congenital abnormities of our species, among the causes of which, intermarriage of members of the same family blood may appear not the least important.

Passing allusions to the evil consequences of marriages of consanguinity may be found in a number of authors, but the subject has not been made a point of special inquiry, so far as I have been able to learn, except by Rev. Charles Brooks in a lecture before the American Association for Advancement of Science in 1855; by two French writers, Rilliet and Menière in 1856, and by the present reporter in 1857.

To Dr. John Bartlett, of Keokuk, belongs the credit of having projected the first effort to set the question at rest by accumulating a sufficient number of facts to furnish positive testimony either corroborating or refuting the popular idea of deterioration of offspring from such marriages. A loss of health compelled him to

abandon, for a time at least, his intentions, and he has generously placed his material in my hands for the benefit of the Association and profession at large.

Dr. H. P. Strong, of Beloit, Wisconsin, had also collected accounts of instances of family intermarriage for the purpose of deducing and publishing observations upon the subject. But so soon as he heard of the appointment of a committee by the American Medical Association to collect facts in regard to marriages of consanguinity, he placed his many carefully detailed cases at the disposal of the Association through their committee. Such instances of generous sacrifice of labor and purpose as the two foregoing demand our highest appreciation.

It was the design of the reporter to collect not only a sufficient number of observations of marriages of consanguinity to enable us to declare positively in regard to their own essential results, but also to collect a sufficient number of observations of marriage where no such influence obtains, to constitute an authoritative standard, so that by comparing the results of the two classes we might establish beyond controversy the affirmative or negative of the question premising this report.

With regard to the first class, or marriages of consanguinity, my success in collecting facts has been beyond my expectation; my tables will exhibit results of near nine hundred such marriages, a sufficient number to warrant the belief that any additions thereto, if procured in the same manner, would not materially affect the ultimate result. Of marriages of the second class, or between parties neither themselves related nor the descendants of blood relations, I regret to say that my exertions to collect observations have not been so successful. My tables comprise only one hundred and twenty-five observations of this character, which, however correct they may be in selection and statement, are not ample enough in number to justify me in offering them as the average results of marriage where no influence of consanguinity prevails. And unfortunately, there are no researches, so far as I have been able to learn, which establish the average fecundity and vital statistics of marriage in the United States.

The original statistics which appear in my report, have been furnished exclusively by reputable physicians in the various States to which they are credited. The respectable sources from whence they are derived should stamp them as high authority, and I bear cheerful testimony to their accuracy and reliability, feeling satisfied

that all future investigations in this field will bring additional evidence that they are faithful records of truths. But while indorsing the truthfulness of these statistics, it is my duty to state, that those which relate to marriages of consanguinity, should probably not be received as a completely true representation of the results of such marriages; some modification of the mean of results might occur if the statistics of *all* instances of in-and-in marrying, in the Union, for example, could be comprised in one report. It is natural for contributors to overlook many of the more fortunate results of family intermarriage, and furnish those followed by defective offspring or sterility. The mere existence of either of these conditions would prompt inquiry, while the favorable cases might pass unnoticed. Contributors have been particularly requested to furnish, without prejudice or selection, all instances of marriages of consanguinity within their various circles of observation, whatever their results. I have reason to believe that in every instance they have complied with this request so far as it was practicable to do so. Consequently, I have no further cause for supposing that the mean of defects would be lessened, were it possible to include every case of marriage of kindred existing in the population which affords those on my tables, than the mere inference that some cases with favorable results may have passed unnoticed.

Eight hundred and seventy-three observations of marriages of consanguinity of various degrees of relationship are arranged upon the tables. They were furnished from the following States:—

Maine	12	Georgia	30
New Hampshire	44	Alabama	22
Vermont	9	Mississippi	14
Massachusetts	87	Arkansas	7
Connecticut	35	Tennessee	53
New York	57	Kentucky	137
Pennsylvania	34	Missouri	69
New Jersey	33	Illinois	16
Delaware	7	Indiana	73
Maryland	2	Ohio	18
Virginia	24	Michigan	34
North Carolina	11	Wisconsin	42
South Carolina	3		
		Total	873

That these observations might be more readily studied, they have been arranged upon the tables, in classes corresponding with their estimated grades of relationship, as follows:—

Classes.	Degree of relationship.	Number of observations.
A.	Instances of marriage or incestuous intercourse between brother and sister, or parent and child	10
B.	Instances of marriage or incestuous intercourse between uncle and niece, or aunt and nephew	12
C.	Marriage between blood relations who are themselves the descendants of blood relations	61
D.	Marriage between double first cousins	27
E.	Marriage between first cousins	600
F.	Marriage between second cousins	120
G.	Marriage between third cousins	13
H.	Marriage irregularly reported, all first cousins	30
	Total	873

The tables throughout the various classes corresponding to the degrees of relationship, are constructed in the same manner; first, there is a statement of temperament, health, and other circumstances relating to the parents and date of marriage; then the number, sex, and condition of children, the number dead, and causes of death. In a majority of instances, some important item of information is wanting to render the recital of the case complete, yet very few are so imperfect in detail as to be devoid of interest.

In compiling these cases from the numerous letters which brought me the facts, I have as nearly as possible preserved the language of the contributor. The descriptions of temperament have been copied verbatim, except in three instances, in all of which the reporter supposed the meaning of the contributors would be better apprehended by the employment of other language.

In some cases, I have from the tenor of the letters, supplied certain points of unstated information. For example, it has occurred that no statement was made of the health or habits of parents, but some circumstance detailed in the latter has authorized the reporter to describe them, inferentially, as either "good" or "bad," and they have been so entered upon the tables. These instances have been very rare, but it has more often happened that the date of marriage was not mentioned, and in such cases, when any given facts in regard to the age of children, or any other circumstance, led the reporter to infer that those marriages had occurred sufficiently long for the period of reproduction to have transpired, the dates have been denoted by the figures 1835, preceded by a dash. This rule has been adopted, because I have arbitrarily fixed twenty-two years as the extreme average length of time married women continue to produce in this country; consequently, all marriages set down upon

these tables as having occurred before 1835, are supposed to be complete in their results, so far as it regards reproduction.

It is not impossible that some slight errors may have been committed by the reporter in respect to these two interpolations, but they are believed to be so trivial, even if they exist, as to exert no influence over the result; and I would not suppose it important to speak of these alterations except as an act of justice from myself to those who have been my co-laborers.

The attention of contributors has been especially solicited to the temperament and constitutional idiosyncrasies of parents. I have not, however, attempted to deduce any conclusions from the information supplied in regard to temperament. The mere fact that the term itself has a meaning so unfixed and so differently understood, that physicians would have different ideas of its application to the same individual, forms a difficulty at the very threshold of any effort to establish practical laws in regard to the influence which particular conjunctions of parental temperament might exert upon offspring.

In regard to constitutional predisposition and peculiarities of parents, the tables present some interesting facts. It will be perceived that parental infirmities are entailed with great certainty upon the offspring, and this, in the opinion of the reporter, constitutes the strongest argument against the intermarriage of relatives; the fact that family peculiarities, tendencies, and infirmities, either of mind or body, which may be so slight on the part of the parents as to remain latent, become so exaggerated by this "intensifying" of the same blood, that they are in the child prominent and ruinous defects. In this manner I account for the fact that so many of the offspring of kindred parents, who seem in other respects to be well endowed, possess characters so angular and peculiar as to unfit them for the ordinary avocations of life.

In analyzing the defects of offspring, I have assigned a column to each of the four classes of infirmities which are so common in this country as to demand the construction of numerous institutions for their alleviation, viz: deaf-dumbness, blindness, idiocy and insanity; to these I have added a column for epilepsy and one for scrofula. It was my intention to insert a column for the deformed, but as a question arose in my mind as to whether certain personal peculiarities, such as different colored irises, or strabismus, or slight deviations from physical symmetry, should properly be classed under this caption, I determined to omit this

column, and to notice these defects under the head of "Condition of Offspring." Consequently, the deformed are in most instances excluded from enumeration under the head of "defective." Another observation will show that the numbers in the column marked "defective" under-estimate the sum of defects occurring to the offspring of the marriages of consanguinity upon these tables, that is this, in very many instances, where children have died young, their defects have escaped the attention of contributors, and often, perhaps, that of the parents likewise. This remark would hold especially true of congenital deaf-muteism and idiocy, either of which may exist unsuspected in very early infancy. It is not only a natural inference that many deaf and dumb, and idiotic children of the marriages upon these tables, have died without being reported as laboring under these defects, but the supposition finds complete corroboration in the fact that in classes B and D, in both which the percentage of early deaths is largely over that of any other classes, the percentage of defects is less than we are prepared to expect, and the reduction of mean of defects occurs precisely in the columns assigned to deaf-dumbness and idiocy, but more strikingly in the latter.

It has been a source of regret to me that these tables are so voluminous as to require so much space of the published transactions, but every case has been condensed as much as was compatible with its intelligible presentation. And to have omitted all detail of individual cases would have diminished the value of the report, since other statisticians and physiologists might desire to study these facts in relations different from those presented by the reporter. Another inconvenience attending the great compass of these tables, is that it will prevent their general diffusion through those circles where it is more important to awaken investigation and impart knowledge in reference to this subject. In some part, to obviate this difficulty, I have prepared a table of "Aggregates," which is an exhibit of the results of the marriages comprised on the large tables. The reader will find upon this table the whole number and sex of children, with the sum and percentage of each defect, running through all the classes formed by the various grades of relationship.

I have also prepared two tables of comparative results, which, considered in connection with the table of aggregates, present a condensed exposition of the questions involved in my report. The first of these tables is composed of observations of the results of

marriage where no influence of consanguinity prevails. The isolated observations upon this table are brothers and sisters of parties who have married their kindred, and whose cases are detailed among the consanguinity statistics, and are referred to in this table. The observations occurring in groups of from ten to twenty, have been furnished by highly respectable physicians in the various States to which they are credited. The correspondents who furnished these cases selected them as fair examples of the average results of marriage, under similar circumstances, in their various communities. They were chosen without any other restriction or requisition than that the husband and wife should neither themselves be related, nor have been the immediate descendants of kindred parents, and that the females should have ceased to ovulate, so that we might know that the results were complete as it regards fecundity.

The second table is made up in part from a report to the Secretary of State of Ohio, under an enactment of their legislature requiring a census of the deaf and dumb, blind, idiotic, and insane inhabitants of that State, and the number of each of those classes who were the offspring of marriages between blood relations. This latter clause of the enactment was totally neglected in many counties, and in others it seems to have been illy executed, yet this report contains a large amount of information valuable to my purpose, exhibiting as correlative statistics a remarkable correspondence with the facts furnished in my collection of cases. To illustrate more perfectly the coincidence between the statistics from these two sources, I have divided the observations of marriages of consanguinity furnished by the Ohio report into classes, corresponding as nearly as possible with the classification on my own tables; thus—

Classes.	Degree of relationship.	Number of observations.
A.	Marriage or illicit intercourse between brother and sister, or parent and child	3
B.	Marriage between uncle and niece	1
C & D.	C and D were not noted in their schedules.	
E.	Marriage between first cousins	47
F.	Marriage between second cousins	28
G.	Marriage between third cousins	4
H.	Irregular cases, or marriage between cousins, without specification as to degree	72
	Total	155

Next, this table comprises the results of two hundred marriages

from the Ohio report, between the parties to which no ties of consanguinity were supposed to exist, yet each of which had given birth to deaf and dumb, blind, idiotic, or insane issue. These were taken—the first hundred from the commencing pages, and the last hundred from the concluding pages of the report, without other selection than that the parents should be reported as not related (and from those counties which had returned marriages of cousins), and that the defects of offspring should be congenital. The parties to these marriages were undoubtedly the subjects of some influences tending to the depravation of their issue, and yet a reference to the tables will show that the percentage of defects to their offspring is not so great as among the children of the consanguinity marriages. Lastly, the sum of results of marriage upon the first table of comparative results, is brought to this second table, and the percentage of defects and deaths carefully computed.

With a view to ascertain the character and degree of influence exerted upon the vital statistics of marriage by the great diversity of climate of the United States, I have arranged the observations comprised in the three most comprehensive letters, representing classes of consanguinity marriages, viz., C, E, and F, in "climatic divisions," or belts, bounded by the degrees of latitude between which they were obtained. Thus all observations, in each of these classes from between the 32d and 36th degrees of latitude are embraced in the first division, under the caption of "South;" those obtained from the 36th to the 40th parallel, constitute the second, or "Middle" division; those from the 40th to 44th parallels, the third and "North" division. This table would have been of some practical utility, could I have been successful in obtaining a sufficient number of observations of vital statistics of marriage, where no kinship existed, to have admitted of a similar division and comparison of results; now, however, it has nothing to recommend it, except that it has been prepared with much labor, and is free from errors.

The mortuary statistics of the offspring of marriages of consanguinity, and of the offspring of marriage between non-related parties, are interesting subjects of comparison. I am compelled, from lack of time and space, to refer those who seek for precision in regard to the causes of death among the children of kindred parents, to the large tables; here I can only give an abstract containing all the causes of death, so far as known, among the children of non-

related parents, and some of the chief causes of mortality to the offspring of marriages of consanguinity.

Of the former, one hundred and thirty-four died young; sixty-nine of this number have the causes of death assigned—the remainder unknown. Eight hundred and eighty-three of the children of consanguinity marriages died young; the cause of death is given in four hundred and eighty-six of this number—the remainder unknown.

Marriages of Consanguinity.		Marriages of the Non-related.	
Consumption	108	Consumption	6
Scrofulous manifestations in other forms	55	Scrofulous manifestations in other forms	2
Convulsions	44	Convulsions	6
Epilepsy	10	Epilepsy	
Hydrocephalus	21	Hydrocephalus	1
Brain affections	15	Brain affections	3
Scarlet fever	30	Scarlet fever	4
Fever	22	Fever	10
Typhoid fever	8	Typhoid fever	
Measles	1	Measles	2
"Acute inflammatory attacks"	6	"Acute inflammatory attacks"	8
Dysentery	14	Dysentery	2
Diarrhœa	6	Diarrhœa	3
Croup	8	Croup	2
Whooping-cough	4	Whooping-cough	1
"Asthma"		"Asthma"	2
Psoas abscess		Psoas abscess	1
"Exanthemata"		"Exanthemata"	6
Accidental	25	Accidental	2
Pneumonia	4	Pneumonia	2
Stillborn	37	Stillborn	6
Cholera infantum	15		—
Marasmus	12	Total	69
Dentition	6		
Anæmia	6		
Cyanosis	3		
Apoplexy	3		
Erysipelas	4		
Inanition	4		
Imperfect development	1		
"Insanity"	3		
Total	475		

I have made great effort to ascertain the probable proportion of the deaf and dumb, blind, idiotic, and insane, in our asylums, who are the descendants of blood intermarriages. This effort has not been successful, from the difficulty principals of such institutions

find in gaining the requisite facts. Parents are frequently sensitive on this point; and it is a delicate matter for principals to attempt investigations which the friends of the beneficiaries supposed to be unauthorized by the regulations of their various institutions.

I feel satisfied, however, that my researches give me authority to assume that over ten per cent. of the deaf and dumb, and over five per cent. of the blind, and near fifteen per cent. of the idiotic, in our State institutions for subjects of those defects, and throughout the country at large, are the offspring of kindred parents, or of parents themselves the descendants of blood intermarriage.

The principal of an institution for deaf-mutes communicates the following statement:—

"Of one hundred and eighty-three cases of congenital deaf-dumbness, twenty-eight were known to be the offspring of blood relations. My inquiries have not extended to more than half of the hundred and eighty-three. My impression is that of those born deaf and dumb, at least one-fourth are the children of cousins. It is very difficult, as you are aware, to get reliable information on this subject. * * * One man in this State denied that he had married a blood relation; I have since learned that he and his wife are first cousins, and have six children, three of whom are deaf and dumb."

The principal of another deaf and dumb asylum—a close observer, and one who has long occupied the position—writes as follows: "Since I wrote to you, a day or so ago, I have remembered that we recently received four sisters, the children of parents who were own cousins. They were all the children they had, I believe. The further I extend my inquiries, the greater the number of deaf mutes I find who are the children of near relatives; I have no doubt that at least ten per cent. are the offspring of persons so related."

From another institution for deaf mutes, the following tabular statement was received:—

Whole number of pupils.	Males.	Females.	Scrofulous.	Consumptive.	Idiotic.	Known to be offspring of kindred parents.	Parents not related.	Doubtful as to relationship of parents.
139	71	68	67	7	10	21	32	58

This estimate shows over fifteen per cent. of the whole number of pupils to have been offspring of consanguinity marriages.

With regard to the frequency of idiocy as a result of intermarriage of relatives, and the probable proportion of those laboring under this defect who are descendants of such unions, I have received the following statement from a highly respectable physician of Connecticut:—

"Two years ago circulars were issued to every physician in Connecticut, to clergymen, to town-clerks, and to the first selectman of every town in the State, containing minute questions relative to the probable causes of the cases of idiocy reported. The question, Whether consanguinity was a cause or not, was answered in 160 cases, and assigned as a cause in 20 of them. An adequate cause of idiocy was reported in 310 cases, but the question concerning consanguinity was answered in only 160 cases. Taking it for granted that every instance of relationship of parents, in the 310 cases, was reported, we find that consanguinity of parentage is a cause of $\frac{1}{16}$th of the idiocy in Connecticut. If we follow the idea that no attention whatever was paid to the question, except in the 160 cases, then we find it a cause of $\frac{1}{8}$th—taking the mean, it is the cause of $\frac{3}{16}$ths of all the idiocy in the State."

In addition to these facts, and others which I have gained by correspondence with gentlemen who have given close attention to these points, the following perfectly legitimate process of computation confirms me in the opinion that the previously announced estimates are very nearly correct. The classes C, D, E, F, G., of the consanguinity tables, comprise 787 marriages of cousins, 246 of which have given issue to deaf and dumb, blind, idiotic, or insane children.

Admitting the same ratio to prevail, the Ohio report, which contains 151 marriages of cousins, followed by deaf and dumb, blind, idiotic, or insane offspring, would indicate the existence of 332 other marriages of cousins in the same population, not followed by such defects. The counties which furnish this 151 marriages, as above, and which are supposed to comprise in their limits 332 unreported marriages, making a total of 483, contained in 1850 a population of 1,528,238. If the same ratio be supposed to exist throughout the Union, there would be found to the twenty millions of white inhabitants, six thousand three hundred and twenty-one marriages of cousins, giving birth to 3,909 deaf and dumb, blind, idiotic, and insane children, distributed as follows:—

Deaf and dumb	1,116
Blind	648
Idiotic	1,854
Insane	299

Then, if the figures of the last United States Census still applied to our population, there would now be found in the Union:—

9,136 deaf and dumb, of whom, 1,116, or 12.8 per cent., are children of cousins.
7,978 blind, of whom 648, or 8.1 per cent., are children of cousins.
14,257 idiotic, of whom 1,844, or 12.93 per cent., are children of cousins.
14,972 insane, of whom 299, or 1.9 per cent., are children of cousins.[1]

I invite the attention of gentlemen of this Association to this calculation of probabilities either to confute or confirm it by any facts in their possession.

A very cursory examination of the tables of my report will suffice to show that *pari-passu* with the increment of the same blood the sum of defects of offspring is likewise increased. Classes D and G present exceptions to this rule. As it regards D, the supposed reason for this deviation has been already stated, namely: that its mortality list is so large; while class G presents so few observations as to satisfy us that they attracted notice solely because of their unfavorable results.

But notwithstanding these two exceptions, the increase and diminution of calamities to offspring correspond so closely with the increase and decrease of relationship, as to fix the conviction firmly in the mind of the reporter, that multiplication of the same blood by in-and-in marrying does incontestably lead in the aggregate to the physical and mental depravation of the offspring. And if we admit the above statement, which the observations here presented abundantly prove—that defects of offspring multiply precisely as we multiply the same blood—and to this admission join the fact that all those contingent circumstances of parental health, habits, proclivities of constitution, sexual incongruity, &c., are as liable to affect one class as another, we cannot rationally assign these effects to any other influence than that of consanguinity.

I am constrained to express my sincere regret that this report must be offered in a crude, unfinished state. The study of this interesting subject is, if thoroughly investigated, an elaborate science,

[1] The reader will perceive that since these estimates were made, some cases have been added to the consanguinity tables; also, that in the computations small fractions have been occasionally left off, or slightly altered when appearing in the quotient.

and the reporter labored under erroneous impressions when he supposed that the important facts bearing upon it could be collected, arranged, and properly elucidated in the short period of a year. I cannot prosecute these researches any further, having already devoted more time to them than it was proper to spare from the more practical and important branches of the profession. It was impossible to incorporate more than a mere tithe of the large amount of interesting and valuable information in my possession; the remainder I will carefully preserve, and hold subject to the call (under certain limitations) of any physiologist[1] whose tastes, attainments and leisure, qualify him for the task of completely elaborating the subject.

The thanks of the Association are eminently due to those physicians whose love of science induced them to assume the disagreeable office of eliciting and supplying the information comprised in these tables. Their contributions were furnished under a pledge that no individualization of contributors was to enter my report; consequently, no other motive could have actuated them than an earnest interest in science, and in all questions touching the well-being of their species. Personally, I offer them my grateful acknowledgments for their co-operation. I trust they will concur with me in the opinion that the chief merit of my report is, that the facts they have furnished me have been fairly and honestly transferred to its pages.

[1] Should Dr. Bartlett recover his health, and desire to prosecute his work, his claims are entitled to first consideration.

CLASS A.—*Instances of Marriage or Incestuous Commerce*

PARENTS.							
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE.	
						M.	F.
1	M. F.	Sanguine. "	Both of good constitution and habits; wife, husband's half sister.	Farmer.	1817	21	17
2	M. F.	Unknown. Bilious sanguine.	Both healthy and good habits; half brother and sister.	Farmer.	1840	25	..
3	M. F.	Unknown. "	No report of health or habits. The husband was offspring to the same father, but by a former wife, consequently half sister to his wife, with whose family he had but little association previous to his marriage; both belong to lower walks of life.	..	..	..	..
4	M. F.	Unknown. "	Husband and wife were offspring to the same father, the former legitimate, the latter illegitimate; the husband formed an attachment to his half sister while ignorant of her parentage; a revelation of the truth did not alter his purpose, and they were married.	..	—1835	..	..
5	M. F.	Nervo-lymphatic. Sanguine.	Male was not healthy.—Female, robust; no statement of habits. These parties were not married, but were guilty of incestuous intercourse; they were full brother and sister.	..	1837	..	..
6	M. F.	Unknown. "	No report of health or habits; parties were full brother and sister, and had incestuous intercourse. Both were finely developed and handsome, with dark hair and eyes, resembling greatly.	..	1846	20	14
7	M. F.	Unknown. "	No report of health and habits; parties were half brother and sister, one being a legitimate, the other an illegitimate child of the same father. They married without any suspicion of their relationship.	Farmer.	—1835	Young.	
8	M. F.	Unknown. "	Both good health; incestuous intercourse between full brother and sister.	..	1836	Young.	
9	M. F.	Unknown. "	Both supposed to be healthy; an instance of incestuous commerce between father and daughter.	..	1830	..	..
10	M. F.	Unknown. "	The male of excellent health and intellect, and good social position, seduced his granddaughter, at that time a model of female beauty and good mental endowments.	Lawyer.	1827	Unk'n.	17

between Brother and Sister or Parent and Child.

CHILDREN.																
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
7	6	1	7	..	..	1	..	..	..	..	..	..	..	..	Six cannot speak so as to be understood, except by their immediate family.
5	2	3	5	..	..	5	..	1	3	..	..	..	..	..	
1	..	..	1	..	..	1	..	..	..	..	..	..	..	..	This child is marked with the singular peculiarity of having one blue and one black eye.
5	..	..	5	..	..	5	..	..	..	..	..	..	..	..	Three are complete idiots, the other two imbeciles.
1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	This child is now 20, and is healthy, bright, and active.
1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	This child is an albino, of delicate constitution, not deficient in mental endowments, is tall and stooping, and has an awkward shambling gait, now 12 years old.
7	3	4	6	..	..	6	..	..	..	..	..	..	..	..	These children, except one son, have six fingers on each hand, and six toes on each foot, and are otherwise "hideously deformed" as well as mentally imbecile.
1	1	..	1	..	..	1	..	..	..	..	..	..	..	..	This child is now an adult, a mere pigmy in size, with a badly proportioned body, and a fatuous vacant expression of countenance.
2	2	..	2	..	..	..	..	..	2	..	..	..	..	..	These children were twins, and had pelves resembling the female in form. After maturity they walked like females, and were feeble and scrofulous.
1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	This child presents a peculiar appearance, his extremities are longer than natural, his movements are lax and swinging, his countenance strange, his moral proclivities were also striking and anormal; he is now an inmate of a poor-house.

CLASS B.—*Marriage or Commerce between*

PARENTS.							
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE.	
						M.	F.
1	M. F.	Sanguine. "	Both good constitution and habits; female of great personal beauty. The wife was husband's maternal aunt. Both of good social position and easy circumstances of life, and married to cover shame of pregnancy from illicit intercourse.	Farmer.	1836	27	28
2	M. F.	Bilious. "	Both robust constitutions, with active, temperate habits. Wife, niece to husband.	Farmer.	—1835	30	17
3	M. F.	Bilious. Nervous.	Not reported. Uncle and niece.	..	1850	25	19
4	M. F.	Lymphatic. Sanguine.	Intemperate habits. Aunt and nephew.	Laborer.	1830	20	30
5	M. F.	Lymphatic. "	Not reported. Nephew and aunt.	Farmer.	1822	22	24
6	M. F.	Nervous. Sanguine.	Both good constitution and habits. Uncle and niece.	Farmer.	1827	23	..
7	M. F.	Bilious. "	Both dark skin, hair and eyes; health good; medium size. Nephew and aunt.	Farmer and stonemason.	1837	25	30
8	M. F.	Sanguine. "	Both of robust health, and long-lived; still living; over 70 years of age; of thin flesh; resemble so strikingly that they might readily be taken for brother and sister. The wife is husband's niece by his sister.	..	1810	Young.	
9	M. F.	Unknown. "	Both healthy and apparently vigorous, and were never previously married.	..	1849	65	25
10	M. F.	Bilious. "	Both of excellent health and good habits, with dark hair and black eyes; the female is daughter to the husband's brother.	..	1853	Young.	
11	M. F.	Nervous. Leucophlegmatic.	Male, healthy, with regular active habits.—Female, healthy, but indolent; was aunt to her husband.	Mariner.	1830	20	30
12	M. F.	Unknown. "	Both of good health and habits; of German family.	..	..	Young.	

Uncle and Aunt or Aunt and Nephew.

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
4	2	2	2	1	1	1	..	1	..	..	..	..	..	..	The two defective are males; one is deaf and dumb, blind, an idiot, and deformed; the other is epileptic. The females are mediocre in intellect, and altogether unattractive in personal appearance.
7	4	3	..	..	..	..	..	..	..	1	..	..	..	Accidental.	Nothing remarkable about children, except one male is ungainly and awkward.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	The union hitherto sterile.
9	5	4	9	..	..	2	..	..	..	9	..	..	..	Marasmus.	All were deformed in hands and feet.
4	1	3	3	..	..	..	..	..	..	3	..	..	..	Unknown.	The three noted as defective were very much deformed. The one living is a male grown, has curvature of spine, and otherwise defective.
12	..	..	12	..	..	..	1	..	12	..	..	..	..	..	All scrofulous.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Barren.
10	..	..	10	..	1	..	..	..	..	8	..	..	—7	Unknown.	One of the survivors is deformed from congenital spinal curvature, but is otherwise a man of average intellect and business capacity, and of good health. The other is ruddy and healthy in appearance, but, at 40, is a mere child in intellect, and dependent upon his father and deformed brother for support. Both have been married some years, but without issue.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	This child is of fine healthy appearance, and seems to be of precocious intellect; had a convulsion at 2½ years of age, cause unknown.
3	2	1	3	..	1	..	..	..	..	1	1	..	20	Typhoid fever.	The female nyctalopic; all feeble.
3	2	1	1	..	..	..	..	..	..	1	..	1	3	Marasmus.	The sons are healthy; the female was always feeble, and never walked.

CLASS C.—*Marriage between Cousins,*

Number of observations.	Sex of parents in reference to.	PARENTS. TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	AGE AT MARRIAGE. F.
1	M. F.	Unknown. "	No report of constitution or habits. Two brothers married each a second cousin. The male in this union was the product of one of the above marriages, the female of the other, consequently were double first cousins.	No report.	—1835	..	..
2	M. F.	Nervous. "	Constitutions good, habits temperate. Whether the parties to this marriage were first, second, or third cousins is not stated, but their ancestors are reported to have intermarried for two preceding generations.	Farmer.	1790	Usual age.	
3	M. F.	Bilious. Sanguine.	The parties to this marriage are second cousins, their parents were second cousins, their grandparents first cousins, and their great and great-great grandparents also first cousins; thus constituting five consecutive generations of children who practised intermarriage.	..	..	..	..
4	M. F.	Phlegmatic. Nervous.	Male, good health and habits; a laborious agriculturist.—Female, good health and active habits.	Farmer.	1813	27	21
5	M. F.	Phlegmatic. Nervous.	Both good health and habits. Parents in Nos. 4 & 5 were mutually brother and sister (that is, the male of one was brother to female of the other), while each was first cousin to his wife; their parents were also double first cousins. To illustrate this intricate entanglement, suppose that A and C, two brothers, married B. and D, two sisters, their double first cousins; the union of A and B resulted in a son D, and a daughter F: that of C and D in a son E and a daughter G; then if E marries F, and G marries H, we have the relationship of parties in Nos. 4 and 5.	Farmer.	1816	..	..
6	M. F.	Unknown. "	No report; parties were third cousins. Female, daughter of No. 94, Class E.	..	..	..	..
7	M. F.	Unknown. "	No report; third cousins. Female, daughter of No. 94, Class E.	..	..	..	..
8	M. F.	Unknown. "	Both of good constitutions and habits, condition in every respect supposed to be favorable to production of healthy offspring. The male was offspring of cousins, and married his first cousin.	..	1830	..	..
9	M. F.	Bilious.	Both were large, healthy, good intellects, and industrious habits; they were first cousins, and so were their parents.	Farmer.	1797	24	..
10	M. F.	Unknown. "	Both good health and habits. The male has feeble intellect, is in personal appearance outrageously ugly, squints, and distorts his mouth in a disagreeable manner. The male was offspring to Class E, Nos. 94, 95, and 96, and first cousin to his wife.	Farmer.	..	Young.	
11	M. F.	Bilious. Nervous.	Male vigorous; intemperate at times.—Female vigorous; no report of habits. These parties are first cousins, and their parents also.	"Jack at all trades."	1850	25	20

themselves the Offspring of Kindred Parents.

CHILDREN.																
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
2	1	1	2	..	..	2	..	..	..	2	1	1	..	Unknown.	Both were congenitally deformed and complete idiots.
5	2	3	2	..	..	..	..	..	..	..	..	..	..	..	The two enumerated as defective are nyctalopic, seeing objects with much more facility and ease during twilight than during a bright day; they have also a peculiar twinkling or dancing motion of the eye during a strong light. There are no complete idiots in the family, but all are in a state of mental weakness bordering upon that condition.
3	2	1	..	..	..	..	..	..	..	..	..	..	..	..	Remarkable for both mental and bodily vigor.
2	1	1	2	..	2	..	..	1	..	1	1	..	15	Epilepsy.	The female would be regarded as half-witted, married and died at 18 in her first labor.
4	2	2	4	..	1	..	..	1	..	2	1	1	14	Epilepsy. Female of fever.	Survivors of strikingly feeble intellect and fragile constitutions.
3	..	..	3	..	..	..	..	..	3	1	..	..	..	Scrofula.	The two survivors have scrofulous diathesis strongly marked.
5	..	..	5	..	..	..	..	..	..	1	..	..	..	Scrofula.	Survivors very feeble in mind and body.
6	3	3	6	..	..	..	..	..	..	..	..	..	..	..	Constitutions are extremely feeble; the males are effeminate in appearance, two have congenital defects of the eyes; the minds of all are below mediocrity, and one is but a degree removed from idiocy; all are remarkably unprepossessing in personal appearance.
4	2	2	3	1	..	..	..	..	2	1	..	..	6	Unknown.	Survivors have scrofulous ophthalmia, and evince both mental and physical deterioration.
3	2	1	..	..	..	..	..	..	..	..	..	..	..	..	All seem to be at least not inferior to their father, but are still too young to determine any question regarding mental endowments.
5	..	..	5	..	..	..	..	..	..	5	..	..	..	Brain diseases.	The children were small and feeble at birth, and all died during the first year.

CLASS C.—*Marriage between Cousins,*

PARENTS.							
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE.	
						M.	F.
12	M. F.	Bilious. Unknown.	Male, not robust; regular habits.—No report as to health and habits of wife. She is a deaf mute, the daughter of first cousins; her parents are parties to No. 113, Class E.	Trader.	1844	23	18
13	M. F.	Unknown. "	Male delicate constitution, supposed by his friends to be consumptive; he is himself the son of first cousins.—No report of wife's health; she is daughter to No. 114, Class E. First cousins to each other.	..	1850	29	19
14	M. F.	Bilious. Nervous.	Both good health and habits. Husband is son to No. 214, Class E, and married his first cousin.	Farmer.	1850	33	..
15	M. F.	Unknown. "	Both parties apparently healthy; the male was son to No. 52, Class F, and married his first cousin.	Mariner.	1836	Young.	
16	M. F.	Unknown. "	No statement as to health of husband.—Wife delicate constitution, but active; daughter of No. 266, Class E, and second cousin to her husband.	..	..	..	..
17	M. F.	Unknown. "	No statement as to health or habits.—Wife was daughter to No. 270, Class E, and was first cousin to her husband.	Farmer.	1821	Young.	
18	M. F.	Unknown. "	Health and habits may be supposed to be good, as no report to the contrary is made by a very careful correspondent. The husband was son of No. 259, Class E, and married the daughter of his maternal aunt.	..	1841	..	..
19	M. F.	Unknown. "	Good health and habits. Husband eldest son of No. 260, Class E, and first cousin to his wife.	..	..	..	..
20	M. F.	Unknown. "	Good health and habits. Wife was daughter to No. 260, Class E, and first cousin to her husband.	..	..	..	..
21	M. F.	Unknown. "	Both of ordinarily good constitutions and mental capacities, and good habits. They were children of first cousins, and were themselves first cousins.	Farmer.	—1835	Young.	

themselves the Offspring of Kindred Parents—Continued.

CHILDREN.																
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN. REMARKS, ETC.
4	3	1	4	2	..	1	..	1	..	1	..	1	2	Hydrocephalus.	The deaf and dumb children of these parents had also strabismus, defective vision, and club feet.
4	3	1	..	..	..	..	..	..	..	1	1	..	4 mos.	Diarrhœa.	Survivors delicate, but have no developed disease.
1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	Living and normal, aged 4.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
11	8	3	5	..	5	..	..	..	..	5	4	1	2 mos. 2 mos. 9 mos. 16 2 wks.	Whooping-cough. " " Dysentery. Unknown.	The blind children had congenital cataract (two males and the three females); two other males were twins and died at two months; one other male died at two weeks. It is not known whether these children who died so young had cataract or not. The male who died at 16 grew to that age healthy and with normal eyes. One male, now an adult, has good eyes, and is healthy and bright. Two males and two females are now blind adults. One male has had one eye operated upon three times without more than a slight improvement of vision. The cataract feels and looks like a small piece of buckskin, and was with great difficulty cut or torn; some rents were, however, made in it, but it had no effect in procuring its solution. They have all some vision, but very imperfect, the light apparently finding its way in on the sides of the eyes as they turn their heads obliquely to an object which they wish to examine. Their eyes are very unsteady, having a continual vibrating or oscillating motion.
1	..	..	1	..	..	..	..	..	..	1	..	..	..	Stillborn.	An acephalous monstrosity. No other child to this date.
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Still young, sex and condition not known.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Lived together several years without issue.
4	2	2	2	..	..	2	..	..	..	2	..	..	4 6	Unknown. "	The two defective were cripples as well as idiotic; although they died at the ages of 4 and 6, they were never able to sit alone, the survivors bid fair to become persons of average mental and physical capabilities.

CLASS C.—*Marriage between Cousins,*

PARENTS.							
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	AGE AT MARRIAGE. F.
22	M. F.	Bilious. Sanguine.	Small, well proportioned, very healthy; dark skin, hair, and eyes; good habits.—Wife, small and fleshy; light hair, eyes, and complexion; health mediocre. The great-grandparents and grandparents to each of this couple were cousins, but their parents were not related by blood. The parties to this marriage are first cousins.	Farmer.	1817	25	20
23	M. F.	Sanguine.	Small, healthy, fair skin, sandy hair, and good habits.—Wife, good size, healthy, dark hair, and good skin; has "dancing eyes," and a little near-sighted. The husband and wife are second cousins. The grandparents and great-grandparents of each were cousins, but their parents not related by blood.	Clergyman.	1830	25	21
24	M. F.	Sanguine. "	Both good constitutions, ruddy complexions, sandy hair; husband died 15 years after marriage. These parties were double first cousins, and their parents first cousins.	..	1837	Young.	
25	M. F.	Sanguine. Melancholic.	Robust constitutions; female, strumous, regular habits. These parents were descendants of first cousins, and were themselves first cousins.	Merchant.	1840	28	17
26	M. F.	Phlegmatic. "	Both strumous diathesis, regular habits. The parents of the wife were first cousins; those of the husband not related, but his grandparents were second cousins. The parties themselves were first cousins.	Farmer.	1837	22	20
27	M. F.	Phlegmatic. Choleric.	Both scrofulous. The parents of the husband not related. The wife was the offspring of uncle and niece, and was first cousin to her husband.	Farmer.	1855	18	23
28	M. F.	Sanguine. Phlegmatic.	Both bad constitutions; husband, epileptic; wife, scrofulous. Both the parents and grandparents of the husband were first cousins. The parents of the wife were first cousins, while she was first cousin to her husband.	Farmer.	1833	19	16
29	M. F.	Phlegmatic. Choleric.	Both strumous. The wife was the only child of first cousins, and her family once remarkably prolific. She was second cousin to her husband, and ultimately died of phthisis.	Lawyer.	1820	18	14
30	M. F.	Phlegmatic. Melancholic.	Both disposed to strumous disorders. The wife was product of a union between uncle and niece, and was first cousin to her husband.	Farmer.	1833	18	15
31	M. F.	Sanguine. Lymphatic.	Very vigorous constitution, regular habits; descended from a family remarkably athletic and long-lived. This family connection is so extensive and have so frequently intermarried, that the network of kinship cannot now be unravelled.—No report of wife's health or ancestry, is first cousin to her husband.	Farmer.	1822	25	25
32	M. F.	Nervous. Lymphatic.	Both good health and regular habits; husband of diminutive stature, same family as male of No. 31; wife, no report of ancestry, is first cousin to her husband, died ultimately of cachexy and dropsy.	Farmer.	1815	25	25

themselves the Offspring of Kindred Parents—Continued.

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
7	3	4	..	..	..	..	..	..	..	1	1	..	17	Fever.	The survivors are all good looking and healthy; four of them are near-sighted; all are married, and to parties not previously allied to them. All these marriages have proved barren, except that of one female, who has had two husbands, and borne one daughter, whether by first or second husband not reported.
8	5	3	..	..	..	..	..	..	..	2	1 1	..	—5 20	Unknown. "Killed."	Survivors all healthy, and very sensible; two daughters and one son are albinos and near-sighted.
1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	This child is now in her twelfth year, is healthy and very much like her mother.
4	3	1	4	..	..	..	..	..	4	2	1	1	—1	Convulsions.	The mother aborted once.
8	5	3	8	1	..	1	..	..	8	6	3	3	—6	Convulsions.	These were the first instances of idiocy and muteism known in the history of the family. In addition to these births, there were three abortions.
2	1	1	2	..	..	..	..	..	2	2	1	1	—1	Tuberculosis.	These children probably died of tubercular meningitis. Mother aborted once.
7	3	4	7	4	4	6	..	..	7	4	1	3	—6	Unknown.	The four mutes were also idiots and blind. Mother aborted once.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile, never pregnant.
13	7	6	8	..	..	3	1	..	8	4	2	2	1 7 2	Hydrocephalus 1. Convulsions 1. Cholera infantum 2.	Mother suffered three miscarriages.
6	..	..	4	..	..	1	..	..	1	2	1	..	18	Tuberculosis 1. Unknown 1.	The scrofulous child died of combined influence of the exhaustion from long standing coxalgia and pulmonary phthisis. Two of the survivors, a boy and a girl, are dwarfs, aged respectively 16 and 18; they are the size of, and resemble, children of 8 and 10 years of age.
4	2	2	2	..	..	..	..	..	..	..	..	..	..	..	Both of the sons are of very diminutive stature. One of the daughters, after bearing many children, died of dropsy; the other now exhibits tendency to the same disease.

CLASS C.—*Marriage between Cousins,*

PARENTS.							
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE.	
						M.	F.
33	M. F.	Bilious. Sanguine.	Both good health and regular habits; husband, same ancestry as males of Nos. 31 & 32, and is dwarfish: wife, no report of ancestry, first cousin to husband, is tall and corpulent.	Farmer.	—1835	..	..
34	M. F.	Unknown. "	No report of health or habits; husband of the same ancestry as Nos. 31, 32, & 33; wife is third or fourth cousin to her husband.	Farmer.	—1835	..	..
35	M. F.	Unknown. "	Both good health and habits; wife is daughter to No. 439, and first cousin to her husband, has very protracted labors.	Farmer.	1851	..	..
36	M. F.	Unknown. "	Good habits, not healthy; was son to No. 5, Class E; first cousin to his wife.—Wife, good health and habits; after bearing two children, her husband died, and she married a man not related, and had many abortions, but no living child.	Farmer.	—1835	..	..
37	M. F.	Unknown. "	Both good health and habits; female was daughter to No. 434, Class E, and first cousin to her husband. The male died at 32, disease unknown; female died at advanced age, of phthisis.	Farmer.	—1835	30	20
38	M. F.	Unknown. "	Both good health; female same as in No. 37, and daughter to No. 434, first cousin to her husband, died of phthisis at very advanced age.	Farmer.	—1835	30	..
39	M. F.	Unknown. "	Good physical development, health, and habits, son to No. 434, Class E, and brother to female No. 37 & 38, first cousin to wife.—Wife, good health and habits.	Farmer.	—1835	30	20
40	M. F.	Unknown. "	Good health, habits irregular and intemperate, was first cousin to his wife.—Wife was dyspeptic, and suffered from uterine derangements; was daughter to No. 424, Class E.	Farmer.	—1835	40	30–40
41	M. F.	Phlegmatic. Unknown.	Both healthy, with temperate active habits; the husband is descendant of No. 485, Class E, and is first cousin to his wife.	Farmer.	1832	25	..
42	M. F.	Unknown. "	Both supposed to be healthy; the male is offspring of No. 490, Class E, and is first cousin to his wife.	Merchant.	1842	Young.	
43	M. F.	Bilious. Nervo-lymphatic.	The male is now laboring under hypochondriasis; he was the offspring of a marriage between first cousins, and was first cousin to his wife.—Female supposed to be of good health and habits.	Farmer.	1820	25	20
44	M. F.	Unknown. "	Good health and habits.—Female was daughter to No. 424, Class E, and first cousin to her husband; was not robust; habits, good.	Farmer.	—1835	30	20
45	M. F.	Unknown. "	Good health, but intemperate.—Female was daughter to No. 424, Class E, first cousin to husband.	Farmer.	—1835	30	21
46	M. F.	Bilious sanguine. "	Both supposed to be of good health and habits, and of superior mental developments; female was daughter to No. 510, Class E, and second cousin to her husband.	Merchant.	1837	Young.	
47	M. F.	Nervo-sanguine. "	Both light hair and eyes, good health and habits; female was daughter to No. 25, Class D, and first cousin to her husband; died a few years after marriage of tuberculosis.	..	1835	Young.	

themselves the Offspring of Kindred Parents—Continued.

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
5	4	1	5	..	..	1	..	..	..	1	1	..	..	Typhoid fever.	The children are all dwarfs, though the sons, following the mother, are of good flesh, although of small stature.
8	6	..	4	..	..	..	..	..	..	..	..	..	..	..	Four have arrived at adult age, and their stature is less than 4 feet 6 inches.
2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Not robust, tolerably healthy.
2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	More diminutive than their parents, but not otherwise defective.
1	1	..	..	..	..	..	..	..	..	1	1	..	23	Phthisis.	..
5	3	2	..	..	..	..	..	..	..	1	1	..	..	Phthisis.	No defects reported among survivors.
8	4	4	1	..	..	..	..	..	..	..	..	..	..	..	One daughter has spinal curvature, nothing unusual about the others.
2	1	1	2	..	..	..	..	..	..	..	..	..	..	..	Both unhealthy, and unattractive in personal appearance.
9	6	3	3	..	..	..	..	..	..	..	..	..	..	..	These children are all living and healthy, with sound minds. Three have strabismus, no other defects.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
7	3	4	7	..	..	7	1	..	..	..	..	..	..	..	These children have scarcely intellect sufficient to enable them to work on a farm, the insane daughter is confined in a cage at her father's house. Two of the sons at 24 and 26 are bald, as is their father.
6	3	3	..	..	..	..	..	..	..	..	..	..	..	..	No defects.
8	4	4	..	..	..	..	..	..	..	..	..	..	..	..	One daughter myopic, no other defects.
7	4	3	..	..	..	..	..	..	..	..	..	..	..	..	All normal.
1	1	..	..	..	..	..	..	..	..	1	1	..	—12	Scarlatina.	Normal and good intellect.

CLASS C.—*Marriage between Cousins,*

Number of observations.	Sex of parents in reference to.	PARENTS. TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	F.
48	M. F.	Nervo-sanguine. "	Same male as in No. 47.—Female, sister to female in No. 47.	..	1844	.. ..	.. ..
49	M. F.	Unknown. "	Both healthy, habits unknown; wife was daughter to No. 93, Class F, and second cousin to her husband.	Farmer.	1852	27	22
50	M. F.	Lymphatic. Melancholic.	Healthy and regular habits, but leading an inactive life, is son to No. 94, Class F, and second cousin to his wife.—Wife healthy and regular habits.	Of leisure.	1835	25	22
51	M. F.	Unknown. "	Both good health and habits; the male filled a position of high political honor and trust, and was the offspring of first cousins, and first cousin to his wife.	Lawyer.	—1835	Young.	
52	M. F.	Unknown. "	Both good health and habits; male was brother to male in No. 51, and first cousin to his wife. The males of Nos. 51 & 52 were nephews to male in No. 541, Class E. A third brother married out of the family, and has one healthy and promising son.	Mariner.	..	Young.	
53	M F.	Unknown. "	Both good health and habits. Both were off-spring of first cousins, and were third cousins to each other; they resembled greatly, and were feeble minded.	..	..	..	..
54	M. F.	Unknown. "	Of good health and mind, and fine physique, was nephew to male No. 561, Class E, and after death of his wife married a woman not related, who bore him three children conspicuous for beauty, brightness, and vigor.—Wife, feeble in body and mind; daughter to No. 561, in Class E, and first cousin to her husband.	..	—1835	Young.	
55	M. F.	Unknown. "	Both good health and habits. Grandparents to both parties were first cousins, and they were first cousins.	..	—1835	Young.	
56	M. F.	Unknown. "	Both good health; male was off-pring of No. 111, Class F, and was first cousin to his wife.	..	—1835	Young.	
57	M. F.	Unknown. "	Both good health and habits. The parties were first cousins, and the grandmothers of each were sisters. Consumption was not a family disease, yet the female died of this disease at the age of forty.	..	—1835	Young.	
58	M. F.	Unknown. "	Both were very thin, nervous, and melancholic, but otherwise in good health. They had the same peculiarities of form, manner, &c. Both were off-pring of first cousins, and were first cousins to each other; were wealthy, and in circumstances favorable to develop offspring.	Farmer.	1815	Young.	

themselves the Offspring of Kindred Parents—Continued.

CHILDREN.																
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
3	..	3	1	..	..	1	..	..	..	1	..	1	4	..	The idiot died; the survivors, one 7 and the other 4, are hardly an average in intellectual development.
3	1	1	..	..	..	..	..	..	..	1	..	..	..	Stillborn (sex unknown).	The survivors are healthy, aged 1 and 4 years.
5	4	1	1	..	..	..	..	..	1	4	3	1	10 mos. 2 6 9	Unknown 1. Scarlatina. " Dysentery 1.	These children were all healthy previous to their final sickness, except the one affected with scrofula.
4	..	..	4	..	..	1	..	..	2	2	..	..	..	Scrofula 2.	One of the survivors has strabismus, the other is idiotic.
4	..	..	4	..	..	1	..	..	4	..	..	..	..	..	One is of precocious intellect, one an idiot, two imbecile; all scrofulous.
2	..	..	2	..	..	2	..	1	2	..	..	..	..	..	
3	..	..	2	..	..	1	..	..	..	2	..	..	—1 mo. 1	Erysipelas 1. Marasmus 1.	The living child aged twelve is dwarfed mentally and physically.
7	..	..	7	1	..	1	..	..	..	..	..	..	..	..	One has heart disease, several are cross-eyed, none without some blemish or defect.
4	..	..	4	..	..	..	..	..	..	3	..	..	1 mo.	Cyanosis 1.	The survivor is of feeble intellect, and has, like those who died, a distorted spine.
8	2	5	..	..	..	..	..	..	..	5	1	3	28 22 18 17 —5	Phthisis. " " " Unknown.	Of the survivors two certainly have consumption, and the third probably has.
3	2	1	..	..	..	..	..	..	..	..	..	..	..	..	All were thin, small, and deficient in constitution. The female, though apparently in tolerably good health, has not menstruated for 14 years. They all married relations. See Nos. 59 & 60, C. The second son of No. 58 married a woman not related, who bore him one sickly child, which soon died; after death of his wife he married a second cousin, who bore children, but the reporter was not informed as to their condition.

CLASS C.—*Marriage between Cousins.*

Number of observations.	Sex of parents in reference to	PARENTS. TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	AGE AT MARRIAGE. F.
59	M. F.	Unknown. "	Both were thin, nervous, and of delicate constitution. The male was offspring to No. 58, and first cousin to his wife, who was also offspring of first cousins; he died two years after marriage, and his widow marrying a man not related, has borne one healthy child.	Farmer.	1840	21	..
60	M. F.	Unknown. "	No report of health or habits. The female was daughter to No. 58, and second cousin to her husband. The husband died four years after marriage, and she still lives in widowhood.	Farmer.	..	..	..
61	M. F.	Unknown. "	Both very small and delicate, and resemble in form and family characteristics. The female died some years after marriage, and the male married a woman not related, who has borne several children, condition unknown. These parties were each descendant of first cousins, and were themselves first cousins.	..	..	..	..

themselves the Offspring of Kindred Parents—Continued.

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
1	..	..	..	..	..	..	..	..	..	1	..	..	..	Stillborn.	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	Either stillborn or died at birth.

CLASS D.—

PARENTS.							
Number of observations.	Sex of parents in referred to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE.	
						M.	F.
1	M. F.	Sanguine. Phlegmatic.	Both ordinarily good constitution and habits.	Farmer.	1841	20	20
2	M. F.	Bilious. Bilio-lymphatic.	Healthy; dark hair, skin, and eyes; rather grave in disposition; in person small, but well formed.—Wife, dark hair, skin, and eyes; dyspeptic, but otherwise healthy; cheerful disposition.	Farmer.	1832	25	20
3	M. F.	Bilious. Nervous.	Healthy; dark complexion, hair, and eyes; morose and melancholy in disposition.—Wife, fair skin, light hair, and blue eyes; not very healthy, but generally cheerful.	Farmer.	1841	38	33
4	M. F.	Sanguine. Nervous.	Good constitution; tall, dark hair; no irregularities.—Wife, unhealthy, dyspeptic; light hair and eyes, good skin.	Farmer.	1831	31	26
5	M. F.	Bilious. "	Dark hair, skin, and eyes; subject to facial neuralgia, otherwise healthy.—Wife, very healthy; dark hair, skin, and eyes.	Farmer.	1817	20	18
6	M. F.	Bilious. "	Both healthy and muscular, with dark hair, complexion, and eyes; temperate habits.	Farmer.	1817	20	20
7	M. F.	Nervous. "	Medium good health, habits good.—Wife, consumptive; habits good.	Carpenter.	1837	22	18
8	M. F.	Sanguine. Bilious.	Good health, and temperate habits; large, tall, and well formed, with fair skin, light hair, and blue eyes.—Wife, dark hair and eyes, good health until within four past years, since when has uterine disorder. Both of strong minds.	Farmer.	1826	30	25
9	M. F.	Nervous. Bilious.	Delicate constitution; intemperate habits.—Wife, good health and habits.	Farmer.	1847	23	.
10	M. F.	Sanguine. Nervous.	Good health and habits.—Wife, feeble constitution, active habits; small in stature.	School teacher.	1825	30	18
11	M. F.	Phlegmatic. Bilious.	Both good health, and still living, though very old.	Physician.	1800	Young.	
12	M. F.	Sanguine. Bilious.	Both good health and habits.	Merchant.	1836	26	27
13	M. F.	Unknown. "	Healthy, leading an active life, good habits.—Wife dyspeptic.	Farmer.	1830	Young.	
14	M. F.	Bilious. Nervous.	Good health and habits.—Wife, delicate, good habits.	Farmer.	1856	27	.
15	M. F.	Unknown. "	No report; but persons of high position, and supposed good health and habits.	Wealthy, no occupation.	1826	Young.	
16	M. F.	Sanguine. Nervo-bilious.	No report of health or habits.	..	1823	Young.	
17	M. F.	Unknown. "	Both good health and habits.	Farmer.	—1835	Young.	

Double Cousins.

CHILDREN.																
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
7	3	4	..	..	..	..	..	..	..	5	2	3	1 to 6	Bilious fever and intestinal worms.	
6	..	..	..	..	..	..	..	..	..	5	..	..	Infancy.		Sex unknown, as all died in infancy, except one, a female, who is now 15 years old, dark hair, skin, and eyes, scrofulous and unhealthy, but good looking.
8	5	3	..	..	..	..	..	..	..	3	2	1	1 Birth.	Unknown.	Survivors not very healthy.
7	2	5	..	..	..	..	..	..	..	1	..	1	..	Dyspepsia.	Survivors nearly all grown, and quite unhealthy.
7	..	..	1	..	..	1	..	..	..	2	..	..	..	Stillborn.	Survivors unhealthy; one dyspeptic, one neuralgic, one a semi-idiot.
8	4	4	..	..	..	..	..	..	..	..	..	..	..	..	All grown and healthy; no defects, except one male is cross-eyed.
1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	Dwarf.
9	..	..	..	..	..	..	..	..	..	2	..	..	..	Unknown.	Survivors small, but healthy; three are albinoes and myopic, otherwise apparently normal and mentally bright.
4	..	..	4	..	..	..	..	..	4	..	..	..	.	..	One stammers badly.
5	2	3	5	..	..	..	5	..	5	3	..	3	20 26 27	Insanity. " "	Survivors feeble, with undoubted signs of early decay.
10	..	..	3	..	..	2	..	..	..	9	..	..	..	Phthisis.	The only living child is a physician of ordinary capacity, and has never had a tooth; the last child was also born without a palate, and otherwise deformed about the mouth.
5	2	3	5	1	..	..	..	..	3	..	..	..	..	..	Children could not hold up their heads until between 1 and 2 years old, nor walk until between 2 and 3.
6	..	..	1	..	..	..	..	1	..	4	..	..	..	Scarlatina 1.	Mother had several abortions, then three children, who perished a few days after birth; of the survivors, one is healthy, the other epileptic.
1	1	..	1	..	..	..	..	..	1	..	..	..	..	..	
4	2	2	..	..	..	..	..	..	..	1	..	..	24	Brain fever.	The survivors healthy, and have married, having themselves healthy children.
9	3	6	3	..	..	..	..	..	..	1	..	1	..	..	The three males have a spinal weakness, by which they are prevented from rising from a sitting posture without first rotating the body from side to side, and when placed recumbent upon the back are compelled to turn upon their faces before rising.
6	..	..	6	..	..	..	1	..	1	..	..	..	..	..	Poor, weak, feeble things, both mentally and physically.

CLASS D.—

Number of observations.	Sex of parents in reference to	PARENTS. TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	F.
18	M. F.	Unknown. "	Both good health and habits; male, vigorous intellect; female, feeble-minded.	Farmer.	—1820	Young.	
19	M. F.	Unknown. "	No report of health or habits.	..	—1835	..	
20	M. F.	Unknown. "	Both ordinarily healthy, with gray eyes, dark skin and hair.	Farmer.	1838	24	20
21	M F.	Unknown. "	Both ordinarily healthy, with dark eyes, hair, and skin.	Iron smith.	1790	22	17
22	M. F.	Sanguine. "	Not very healthy; light hair, skin, and eyes.	Clothier.	1805	21	20
23	M. F.	Unknown. "	Both good health and habits.	..	—1835	Young.	
24	M. F.	Sanguine Nervous	Both good constitutions and temperate habits.	Farmer.	1848	22	19
25	M. F.	Sanguine nervous. " "	Both light hair and eyes, good constitution and habits.	..	—1825	Young.	
26	M. F.	Unknown. "	Both of ordinary good health; the father is subject to attacks of periodical hemicrania.	..	—1835	Young.	
27	M. F.	Nervous. Bilious.	Both good health and habits, and good intellectual culture. These parties are first cousins to each other, while the father of one and mother of the other are first cousins; thus they are nearer than first cousins.	Merchant.	1848	23	22

Double Cousins—Continued.

CHILDREN.																
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
6	2	4	6	..	..	..	..	..	..	..	..	..	..	..	These children were healthy, but of very inferior minds, in fact, almost idiotic; they were near-sighted, and had hair, eye-brows, and lashes of a snowy whiteness. Were albinoes.
2	..	..	..	..	..	..	..	..	..	1	..	..	1 day.	Imperfect development.	Ossification seemed not to have occurred, as the limbs were entirely flexible.
6	5	1	1	..	..	..	..	1	..	1	1	..	3	Unknown.	
4	2	2	..	..	..	..	..	..	..	3	..	..	20 to 30	Fever 1. Consumption 1. Over work 1.	
7	5	2	1	..	..	1	..	..	..	3	..	..	1 to 2	..	
3	..	..	3	..	2	..	..	..	..	..	..	..	..	..	All of them were very feeble.
4	1	3	..	..	..	..	..	..	..	..	..	..	..	..	All healthy with good minds.
7	5	2	..	..	..	..	..	..	..	4	4	..	—12	Scarlatina 4.	One daughter died after marriage of tuberculosis; the other is living, and female to No. 48, Class C. The son has strabismus convergens.
10	2	5	1	1	..	..	..	..	..	3	..	..	10 mos.	Marasmus 1. Stillborn 2.	These children are all dull and peculiar; the mute has slight strabismus. One son has the appearance of being prematurely old.
2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	One has had chorea, the other healthy.

CLASS E.—

PARENTS.

Number of observations.	Sex of parents in reference to	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	AGE AT MARRIAGE. F.
1	M. F.	Leucophlegmatic. Sanguine.	Constitutions delicate; temperate and good habits.	Farmer.	1825	28	20
2	M. F.	Sanguine. Leucophlegmatic.	Robust; a moderate drinker.—Wife, delicate; good habits.	Farmer.	1851	25	20
3	M. F.	Nervous. Leucophlegmatic.	Predisposed to paralysis; temperate, good habits.—Wife, consumptive tendency; good habits.	Clerk.	1825	30	21
4	M. F.	Unknown. Bilious.	Constitution unknown; dissipated habits.—Wife, good constitution and habits.	Farmer.	1818	..	..
5	M. F.	Unknown. "	Both male and female were supposed to have predisposition to heart disease; both died suddenly, but at advanced age.	Farmer.	—1800	30	20
6	M. F.	Unknown. Lymphatic.	Not robust; good habits.—Wife, very corpulent, tendency to heart disease; good habits.	Farmer.	—1835	..	..
7	M. F.	Lymphatic Unknown.	Very corpulent and asthmatic; brother to female No. 6.—Wife, good constitution and habits.	Farmer.	—1835	30	30
8	M. F.	Unknown. "	Both good constitution and habits.	Farmer.	—1835	..	..
9	M. F.	Unknown. "	Both good constitution and habits; husband, brother to male No. 8.	Farmer.	—1835	..	..
10	M. F.	Unknown. "	Both good constitution and habits; male, rather below ordinary size.	Farmer.	—1835	..	..
11	M. F.	Unknown. "	Same male as No. 10.—Female, good constitution and habits.	Farmer.	..	..	Near 40
12	M. F.	Unknown. "	Both good constitution and habits.	Farmer.	—1835	..	..
13	M. F.	Unknown. "	Both good constitution and habits; female, sister to male No. 12.	Farmer.	—1835	..	..
14	M. F.	Unknown. "	Both robust and good habits; female died after birth of third child.	Farmer.	—1835	..	..
15	M. F.	Bilious. Sanguine.	Robust, strong constitutions, with no bad habits, except being intolerable tobacco smokers; this applies to both.	Farmer.	1834	20 to 30	20 to 30
16	M. F.	Sanguine. Bilious.	Robust, healthy constitutions, with no bad habits but smoking tobacco.	Farmer.	1827	28	28
17	M. F.	Leucophlegmatic. Phlegmatic.	Both excellent constitutions and habits; never sick; Nos. 15, 16, & 17 are instances of three brothers marrying three sisters.	Farmer.	1825	29	18
18	M. F.	Sanguino-bilious. "	Both of good constitution and habits; the wife, a daughter of husband's maternal uncle.	Mechanic.	1856	26	22
19	M. F.	Sanguine. "	Good habits and constitution.—Wife, medium constitutional vigor; good habits.	Farmer.	1845	38	22
20	M. F.	Unknown. "	Good constitutions; high livers; otherwise of regular habits.	No occupation.	1810	24	18

First Cousins.

CHILDREN.																
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
8	3	5	3	1	..	3	..	..	..	3	2	1	1	Unknown.	
3	1	2	3	..	..	3	..	1	..	1	..	1	2	Cholera infantum.	
9	5	4	2	1	..	2	..	1	..	2	1	1	2 9	Epilepsy. "	
7	4	3	3	1	..	2	..	1	..	..	..	..	..	..	
7	2	3	..	..	..	..	..	..	..	2	..	..	..	Sex and disease unknown.	No noticeable defects, though all the children, except one female, were unhealthy; all exhibited tendency to heart disease except this daughter, and her death occurred so suddenly as to induce belief that she was a victim to the family malady.
5	1	1	..	..	..	..	..	..	..	3	..	..	..	Sex and cause unknown.	The two eldest, a son and daughter, arrived at maturity; several abortions occurred and are not reckoned among the births.
2	1	1	..	..	..	..	..	..	..	..	..	..	..	..	Nothing unusual about offspring, both attained to maturity.
7	..	7	..	..	..	..	..	..	..	..	..	..	..	..	Normal in health and sprightliness.
4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sex not known; nothing unusual about offspring.
5	4	1	..	..	..	..	..	..	..	..	..	..	..	..	All below usual stature, especially the female, whose short extremities rendered her diminished size more apparent; they have each but two incisors in the upper jaw.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Second marriage barren.
6	4	2	..	..	..	..	..	..	..	..	..	..	..	..	Nothing unusual in offspring beyond a slightly increased want of personal symmetry.
2	..	..	..	..	..	..	..	..	..	1	..	..	..	Sex and disease unknown.	The survivor is defective in both physical and mental development.
3	2	1	..	..	..	..	..	..	..	..	..	..	..	..	All normal, physically and mentally; one a preacher of some note.
12	6	6	12	..	..	1	..	1	..	2	1	1	3 6	Scarlatina. Dysentery.	The epileptic is a female, 13 years old, completely idiotic; the remaining nine are half-witted, on the verge of idiocy.
7	3	4	2	1	..	1	..	..	..	2	1	1	3 8 mos.	Scarlatina. Marasmus.	One daughter, aged 25, is thought to possess better intellect than either parent. The oldest son is of feeble mind; while the youngest, aged 13, is 3½ feet high, of small proportions, a head not increased in size since his second year, and a complete idiot.
7	4	3	..	..	..	..	..	..	..	..	..	..	..	..	All well developed, handsome, and intelligent.
2	..	1	1	..	..	..	..	..	..	1	..	1	1 day	Cyanosis.	
2	2	..	2	..	..	..	..	..	..	..	..	..	..	..	Decided mental deficiency in both instances.
6	4	2	2	..	2	..	..	..	..	1	1	..	..	Unknown.	No mental or other defect.

CLASS E.—

Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	AGE AT MARRIAGE. F.
		PARENTS.					
21	M. F.	Bilious. "	Both of good constitution and habits; the male of large physical development, as likewise the female.	Farmer.	1810	21	18
22	M. F.	Sanguine. Phlegmatic.	Both of ordinarily good constitution and habits.	Farmer.	1835	25	20
23	M. F.	Nervous. Sanguine.	Both of good constitution and habits.	Farmer.	1828	Usual age.	
24	M. F.	Bilious. "	Both of good constitution and habits.	Farmer.	1830	Usual age.	
25	M. F.	Bilious. "	Both of good constitution and habits.	Farmer.	1810	Usual age.	
26	M. F.	Nervous. Phlegmatic.	Both of good constitution and habits.	Farmer.	1833	Usual age.	
27	M. F.	Bilious. "	Both of usually good constitution and habits.	Farmer.	1845	27	18
28	M. F.	Sanguine. Bilious.	Both of usually good constitution and habits.	Farmer.	1830	24	17
29	M. F.	Bilious. Phlegmatic.	Both of usually good constitution and habits.	Farmer.	1835	21	16
30	M. F.	Phlegmatic. Bilious.	Both of usually good constitution and habits.	Farmer.	1818	35	24
31	M. F.	Phlegmatic. "	Both of usually good constitution and habits.	Gambler.	1828	24	20
32	M. F.	Sanguine. Phlegmatic.	Both of usually good constitution and habits.	Farmer.	1832	25	20
33	M. F.	Sanguine. Bilious.	Both of usually good constitution and habits.	Millwright.	1809	25	25
34	M. F.	Bilious. Sanguine.	Both of usually good constitution and habits.	Wheel-wright.	1816	25	20
35	M. F.	Phlegmatic. "	Both of usually good constitution and habits.	Farmer.	1815	22	19
36	M. F.	Nervous. Bilious.	Both of usually good constitution and habits.	Farmer.	1836	30	18
37	M. F.	Phlegmatic. "	Both of usually good constitution and habits.	Farmer.	1845	20	23
38	M. F.	Phlegmatic. Sanguine.	Both of usually good constitution and habits.	Farmer.	1851	18	19
39	M. F.	Nervo-bilious. Unknown.	Both of usually good constitution and habits.	..	..	30	18
40	M. F.	Nervo-sanguine. Sanguine.	Both of good constitution and habits.	Merchant.	—1835	26	18
41	M. F.	Nervo-sanguine. Sanguine.	Both good health and habits.	..	..	24	17
42	M. F.	Sanguine. Bilious.	Both good health and habits.	..	..	29	22
43	M. F.	Nervo-sanguine. Sanguine.	Both good health and habits.	..	—1835	27	21
44	M. F.	Nervo-bilious. Sanguine.	Both good health and habits.	..	—1835	24	20
45	M. F.	.. Nervo-bilious.	Both good health and habits. By a previous marriage to a husband not related, the mother had borne four children, three sons and a daughter, healthy and perfectly developed.	..	—1835	..	..

First Cousins—Continued.

CHILDREN.																
Number of children.	SEX. Male	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
12	4	8	..	..	..	..	..	..	..	1	..	1	2 mos.	Unknown.	All physically well-developed, but exhibit great apathy and dulness in exercise of mental faculties.
3	..	3	..	..	..	..	..	..	..	1	..	1	2	Unknown.	
2	2	..	2	..	..	1	..	..	1	2	2	..	21 25	Unknown. Consumption.	
5	2	3	2	2	..	..	..	..	..	..	..	..	..	..	
7	4	3	2	1	1	1	..	..	..	..	..	..	..	..	
4	..	..	3	..	..	..	..	..	..	..	..	..	..	..	Nature of defects not reported.
5	1	4	2	..	..	1	1	..	..	1	..	1	4	Unknown.	
5	2	3	1	..	..	1	..	..	..	..	..	..	..	..	
8	3	5	3	..	1	1	..	..	..	1	..	1	2	Unknown.	One cross-eyed and extremely ugly. The blindness was not congenital but caused by accident.
6	3	3	..	..	..	..	..	..	..	3	2	1	12	Pneumonia. Unknown.	
5	..	5	1	..	..	..	..	..	1	1	..	1	6 mos.	Scrofula.	
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	
9	6	3	7	..	7	..	..	..	..	6	3	3	—16	1 burned, others unknown.	
6	4	2	3	..	..	1	2	..	..	2	2	..	6 to 12	Unknown.	
10	7	3	..	..	..	..	..	..	..	2	2	..	—1	Unknown.	One a male, malformed genitals; three strabismic.
5	1	4	1	..	..	..	..	1	..	1	1	..	1	Epilepsy.	
5	2	3	2	..	..	2	..	..	..	1	..	1	4	Bilious fever.	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	This union to this date has proved sterile.
3	2	1	..	..	..	..	..	..	..	..	..	..	..	..	All healthy and sprightly.
4	2	..	1	..	..	..	..	..	..	2	..	..	..	Stillborn.	The sex of stillborn unknown; of the survivors, one is well developed and healthy, the other defective mentally and physically. He is of remarkably small stature, articulates imperfectly, and has an unique (not otherwise described) defect of the eyes, which nearly destroys their usefulness. His mother attributes this defect to having unexpectedly met, during pregnancy, a blind man upon a stairway.
1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	Healthy and sprightly. Mother died soon after confinement.
1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	Healthy and sprightly. Father died soon after its birth.
2	1	1	..	..	..	..	..	..	..	..	..	..	..	..	Both well developed and healthy.
4	2	2	..	..	..	..	..	..	..	..	..	..	..	..	All normal and sprightly.
4	1	3	3	3	..	..	..	..	..	..	..	..	..	..	The son and one daughter are entirely deaf and dumb; another daughter is a semi-mute, hears and articulates very imperfectly.

CLASS E.—

PARENTS.							
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE.	
						M.	F.
46	M. F.	Lymphatic. Bilious.	Both of good constitution and habits.	Farmer.	1818	..	..
47	M. F.	Bilious. "	Dyspeptic.—Wife, good health and industrious regular habits.	Blacksmith.	1832	24	25
48	M. F.	Sanguine. Bilious.	Constitution infirm; slothful habits.—Wife, good constitution and habits.	Farmer.	1815	30	25
49	M. F.	Bilious. Sanguine.	Both good health and habits; female muscular, remarkable for physical development.	Farmer.	1834	27	17
50	M. F.	Sanguine. Bilious.	Both good health and habits; father muscular.	Farmer.	1836	20	18
51	M. F.	Bilious sanguine. "	Both of sound constitution; laborious and temperate habits.	Farmer.	1817	22	18
52	M. F.	Sanguine. Bilious.	Sound constitution; laborious and temperate.—Wife, feeble constitution; industrious.	Farmer.	1820	21	18
53	M. F.	Sanguine. Nervous.	Male strong, female feeble constitution; both temperate and industrious.	Farmer.	1848	24	19
54	M. F.	Sanguine. Nervous.	Both ordinarily good constitutions and habits.	Farmer.	1850	21	19
55	M. F.	Sanguine. Nervous.	Both ordinarily good constitutions and habits.	Farmer.	1837	..	..
56	M. F.	Nervous. "	Both ordinarily good constitutions and habits.	Farmer.	1840	..	..
57	M. F.	Sanguine. "	Both good constitutions; temperate and regular.	Preacher.	1840	22	20
58	M. F.	Sanguine. Lymphatic.	Both good constitutions; temperate and regular.	Preacher.	1830	..	..
59	M. F.	Sanguine. Melancholic.	Both robust and temperate.	Farmer.	1831	35	..
60	M. F.	Bilious. "	Male, infirm health; female, good health; no irregularities reported. The father has for thirty years had a rough desquamating cuticle on a portion of one leg.	Farmer.	1823	28	20
61	M. F.	Lymphatic. Choleric.	Temperate habits; health not reported.	Farmer.	1825	22	..
62	M. F.	Lymphatic. Choleric.	Temperate habits; health not reported.	Farmer.	1830	24	..
63	M. F.	Sanguine. Lymphatic.	Male, robust; female, delicate. Both temperate.	Farmer.	1835	25	..
64	M. F.	Lymphatic. "	Both robust; temperate.	Laborer.	1854	18	..
65	M. F.	Lymphatic. Sanguine.	Temperate. No report of health.	Farmer.	1853	25	..
66	M. F.	Lymphatic. Sanguine.	Temperate. No report of health.	Farmer.	1830	26	..
67	M. F.	Choleric. "	Good constitutions and temperate habits.	Preacher.	1825	21	..

First Cousins—Continued.

CHILDREN.																
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
6	4	2	4	..	3	3	..	..	..	1	1	..	2	Scarlatina.	One, a female, is both blind and idiotic, and has also cleft palate and hare-lip. The blindness is due, in every instance, to congenital cataract.
8	4	4	1	..	..	..	..	1	..	1	..	1	1 mo.	Phrenitis (convulsions).	Six of the seven survivors have good health and ordinary intellectual capacities.
8	6	2	7	5	..	7	..	..	..	6	..	..	..	..	Five had club-foot; one idiot lived to 14th year; the others died before 5th year, except one daughter who arrived at puberty, married, and died in her first labor.
16	8	8	1	..	..	..	..	..	1	5	..	..	..	Scarlatina 1. Diarrhœa 1. Tracheitis 1. Dysentery 1. Diseased lungs 1.	These children have only medium physical or intellectual development.
8	4	4	..	..	..	..	..	..	..	1	..	..	..	Dysentery.	The survivors are of small physical proportions; intellect normal.
9	4	5	1	..	..	1	..	..	..	4	2	2	1 to 15	Scarlatina 1. Pneumonia 1. Pulmonary disease 2.	
8	4	4	2	..	1	..	..	..	1	5	1	4	..	..	The deaths occurred from infancy to 24; two of scarlatina, others unknown. The survivors exhibit weakness of intellect, but not reaching idiocy.
4	1	3	1	..	..	..	..	..	1	3	1	2	1 to 3	Scrofula 1. Scarlatina 2.	
1	1	..	1	..	..	..	..	..	1	1	1	..	1½	Scrofula.	
9	6	3	..	..	..	..	..	..	..	1	..	1	..	..	All small, feeble, and nervous.
6	4	2	..	..	..	..	..	..	..	1	1	..	3	Cerebral disease.	
5	..	5	..	..	..	..	..	..	..	1	..	1	4	Scarlatina.	
5	..	..	4	..	..	..	1	3	..	2	..	..	..	Convulsions 2.	
8	5	3	..	..	..	..	..	..	..	1	1	..	..	Dysentery.	
13	7	6	6	..	5	5	..	4	..	3	3	..	3 2	Epilepsy and leprosy 1. Croup 1. Birth 1.	The five blind and idiots have a leprous disease of the skin; the eyes present a nebulous appearance; the oldest had, as was supposed, rheumatism in infancy, which has made him a cripple ever since; but three of the survivors have good health.
6	3	3	3	..	..	..	..	..	3	1	..	1	18	Puerperal fever.	All were children by a second marriage; first marriage, no defects in offspring.
2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	Normal.
4	1	3	3	..	..	..	..	..	..	..	..	..	..	..	One blind in one eye congenitally; two dwarfs; intellect bright.
2	1	1	1	..	..	..	..	..	..	1	..	..	..	Umbilical hernia.	Congenital umbilical hernia.
2	1	1	..	..	..	..	..	..	..	..	..	..	..	..	Both are well endowed physically and mentally.
9	4	5	9	..	..	..	..	..	9	2	..	..	..	Cholera infantum.	All are of feeble health.
7	2	5	1	..	..	..	..	..		2	..	..	..	Croup 1. Phthisis 1.	One with club-feet, others normal.

CLASS E.—

PARENTS.							
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	AGE AT MARRIAGE. F.
68	M. F.	Sanguine. Lymphatic.	Male, robust; female, delicate. Both temperate.	Farmer.	1837	23	..
69	M. F.	Sanguine. Lymphatic.	Good constitution and habits.	Farmer.	1840	24	..
70	M. F.	Sanguine. Lymphatic.	Good constitution and habits.	Saddler.	1853	26	..
71	M. F.	Atra-bilious. Unknown.	Good constitution; indolent and intemperate.	Farmer.	1840	21	..
72	M. F.	Choleric. "	Good constitutions and temperate habits.	Physician.	—1835	..	..
73	M F.	Lymphatic. Sanguine.	Not good, intemperate habits.—Wife, not reported.	Mechanic.	—1835	..	..
74	M. F.	Choleric Sanguine.	Both good and temperate habits.	Farmer.	1850	24	..
75	M. F.	Choleric. Sanguine.	Both good and temperate habits.	Farmer.	—1835	..	..
76	M. F.	Choleric. "	Both good and temperate habits.	Farmer.	..	..	..
77	M. F.	Sanguine. Lymphatic.	Both good and temperate habits.	Farmer.	..	..	..
78	M. F.	Bilious. Sanguine.	Both good and temperate habits; husband dark hair, healthy skin; wife, light hair and skin; healthy.	Farmer.	1830	24	30
79	M F.	(Same as in 78.) Sanguine.	Good constitution and habits; light hair and skin.—Wife, died fifteen years after marriage.	Farmer.	1834	28	..
80	M. F.	Bilious. "	Both dark hair, skin, and eyes; small, well-proportioned, healthy and temperate.	Farmer.	1837	25	20
81	M. F.	Unknown. "	Both good health and habits.	Farmer.	1775	24	..
82	M. F.	Unknown. "	Both good health and habits.	Farmer.	1794	40	..
83	M. F.	Nervo-lymphatic. Nervous.	Good health and habits.—Female, tuberculous.	Farmer.	1837	26	20
84	M. F.	Nervous. "	Good health and habits.—Female, dyspeptic.	Farmer.	1817	21	17
85	M. F.	Unknown. "	No report.	Farmer.	1827	..	..
86	M. F.	Unknown. "	Both good health and habits.	Farmer.	1788	25	..
87	M. F.	Unknown. "	Both good health and habits.	Farmer.	1833	35	..
88	M. F.	Bilious. Sanguine-bilious.	Good health and habits.—Female, fair constitution; habits good.	Miner.	1842	21	20
89	M. F.	Nervo-bilious. "	Good health and habits.—Female, confined to bed six years with uterine malady.	Farmer.	1827	22	22
90	M. F.	Unknown. "	Both good health and habits.	Farmer.	1830	37	..
91	M. F.	Unknown. "	Both good health and habits.	Farmer.	1832	25	..
92	M. F.	Lymphatic. "	No report.	Farmer.	1822	25	20
93	M. F.	Lymphatic. Nervous.	Good health; moderate drinker.—Female, good health and habits.	Farmer.	1797	20	18
94	M. F.	Unknown. "	Both good constitutions and habits. No surrounding circumstances known calculated to affect development of offspring.	Farmer.	1825	Usual age.	
95 96 97	M. F. F. F.	Unknown. " " "	Parents of good constitutions, habits, and mental capacities. The male in Nos. 95, 96, and 97 is the same, and the wife is his first cousin in each instance.	Farmer.	..	..	..

First Cousins—Continued.

CHILDREN.																
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
2	1	1	..	..	..	..	..	..	..	..	..	..	..	..	Both normal.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	Normal.
2	1	1	2	..	..	2	..	..	..	1	1	..	..	Typhoid fever.	
4	2	2	..	..	..	..	..	..	..	1	..	1	8	Typhoid fever.	All feeble constitutions; mother died after birth of fourth child.
6	2	4	6	..	..	..	..	..	6	..	..	..	..	..	
3	1	2	..	..	..	..	..	..	..	..	..	..	..	..	Normal.
7	5	2	2	..	..	..	..	1	1	1	1	..	17	Epilepsy.	
5	..	5	5	..	..	..	..	..	5	..	..	..	..	..	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Barren.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Wife died without issue in 1833; the husband then married her younger sister, in No. 79.
6	3	3	1	..	..	..	..	..	1	1	1	..	20	Scrofula.	The remaining children are not very healthy.
5	4	1	..	..	..	..	..	..	..	..	..	..	..	..	Normal and healthy.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
3	1	2	..	..	..	..	..	..	..	..	..	..	..	..	All living; one a clergyman of superior talents.
6	3	3	..	..	..	..	..	..	..	1	..	..	..	Scarlatina.	
7	..	1	6	..	..	..	..	..	..	6	..	..	..	..	All died young but one female; sex of those who died not known.
7	3	4	4	..	..	4	..	..	..	4	..	..	..	..	Survivors have defective constitutions and curvatures of spine.
5	3	2	..	..	..	..	..	..	..	2	1	1	..	..	Three now living, from 60 to 65 years old.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
2	2	..	1	..	..	..	..	..	..	1	..	..	..	Stillborn.	Acephalous; body well formed; no neck, only a hideous face upon the superior extremity of spinal column.
8	3	5	1	..	..	..	..	1	..	1	..	1	2	Whooping-cough.	
2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	Living; æt. 20 and 23.
5	3	2	..	..	..	..	..	..	..	..	..	..	..	..	All living; æt. 4 to 18.
7	..	..	..	..	..	..	..	..	..	4	..	..	..	Unknown.	
8	5	3	4	..	..	4	..	..	..	3	1	2	..	Unknown.	
4	2	2	2	..	..	..	..	..	2	2	..	2	..	Scrofula.	Ordinarily healthy until puberty. Accounts of the females will be found in Class C, Nos. 6 and 7.
5	2	3	1	..	..	..	..	..	..	..	..	..	..	..	All of ordinary mental and physical capacity, except one who is the male parent in observation No. 10, Class C.

CLASS E.—

PARENTS.							
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	AGE AT MARRIAGE. F.
98	M. F.	Unknown. "	Both have brown hair; in the father inclining to auburn; gray or hazel eyes, fair skin; habits good; supposed to be strumous in diathesis.	Literary pursuit (wealthy).	1836	Young.	
99	M. F.	Nervous. Bilious.	Fair skin, sandy hair, is supposed to be strumous from his appearance; possesses an active, well developed mind, and good habits.—Mother, unusually good constitution, dark hair and eyes, complexion inclining to brunette, with florid cheeks, is strikingly good looking.	..	1841	Young.	
100	M. F.	Sanguine. "	Both good health and habits.	Farmer.	—1830	..	..
101	M. F.	Bilious-nervous. Sanguine.	Strumous diathesis, exceedingly uniform and temperate, with black hair and hazel eyes.—Wife, robust, fleshy, light complexion and hair, blue eyes; good habits.	Farmer.	1840	30	19
102	M. F.	Bilious. "	Both good health and habits; husband had been previously married to a woman not related, by whom he had six or eight children, all normal. Both parties to this marriage have black hair and eyes.	Farmer.	1855	40	40
103	M. F.	Sanguine. Nervo-sanguine.	Robust, with temperate active habits. Wife, healthy; good habits.	..	—1835	23	19
104	M. F.	Bilio-nervous. "	Robust, with active habits, good intellect.	Farmer.	—1835	22	18
105	M. F.	Bilio-sanguine. Bilio-nervous.	Male, healthy and robust; female, delicate; both good habits.	Physician.	1850	26	34
106	M. F.	Bilio-sanguine. Bilio-lymphatic.	Health not reported. Husband, dissipated habits.	Farmer.	1838	Young.	
107	M. F.	Sanguine. Bilio-nervous.	No report.	..	1855	Young.	
108	M. F.	Nervo-sanguine. Nervo-lymphatic.	No report.	Farmer.	1850	Young.	
109	M. F.	Sanguine. "	No report.	Farmer.	1837	Young.	
110	M. F.	Strong, sanguine. Nervo-sanguine.	No report of health. Husband, dissipated habits.	..	1840	Young.	
111	M. F.	Unknown. "	No report of health.	..	1822	Young.	
112	M. F.	Bilious (strongly marked.) Nervo-lymphatic.	No report of health.	..	1837	Young.	
113	M. F.	Bilious. Unknown	Both robust health and regular habits.	Farmer.	1827	24	19
114	M. F.	Unknown. "	Both good health and habits.	Merchant.	—1835	..	..
115	M. F.	Sanguine. Nervous.	Both good health and habits.	..	1828	19	16
116	M. F.	Bilious. Nervous.	Both good health and habits.	..	1832	23	21
117	M. F.	Bilious. "	Both good health and habits.	..	1837	22	18
118	M. F.	Bilious. Nervous.	Both good health and habits.	..	1842	26	15
119	M. F.	Lymphatic. Sanguine.	Both good health and habits.	..	1852	28	25

First Cousins—Continued.

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	This daughter has fair complexion, hair inclining to red; in appearance is fragile, but is not known to have been sick; intellect good.
5	3	1	1	..	..	..	..	..	..	..	1	..	10 days.	Cyanosis.	The two oldest sons have defective constitutions; one has attacks of partial delirium; the two younger children have more health, but the daughter finds it difficult to keep up with her classes at school. The mother expressed fears to the contributor that her relationship to her husband had deteriorated their offspring.
6	5	1	2	..	..	2	..	..	..	..	..	..	..	..	One is a complete idiot; the other at best but half witted; both grown.
4	2	2	4	..	..	..	..	..	4	1	1	..	9	Scarlatina.	One female is normal; the other two are near sighted, and the eyes of both are in continual dancing motion; the head of the male is also unsteady.
1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	Club-foot.
4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	All healthy and intelligent.
9	6	3	3	..	..	3	..	..	..	3	..	..	9 18 23	Disease of brain) Inflammatory disease. " "	Three of survivors of "*very feeble intellect*," all below mediocrity.
2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	Good physique; one seems to be a dull boy.
11	5	6	..	..	..	..	..	..	..	5	2	3	1 to 3	..	Survivors normal.
1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	One year old; normal.
3	2	1	..	..	..	..	..	..	..	..	..	..	..	..	Normal.
7	5	2	..	..	..	..	..	..	..	1	..	1	16	Dysentery.	
4	..	4	..	..	..	..	..	..	..	1	..	1	6	..	
10	6	4	..	..	..	..	..	..	..	1	..	1	..	Typhoid fever.	
9	3	6	4	4	..	..	..	..	..	1	..	1	..	..	One male and two females of the survivors are deaf mutes.
14	6	8	13	4	..	2	2	2	4	4	1	3	1 to 10	Scrofula 3. Convulsions 1.	The scrofulous children had ulceration of cervical glands and of the internal ear; one of the deaf mutes married, and is the wife in No. 12, Class C.
11	6	5	2	..	..	..	..	..	2	4	2	2	—6	Hydrocephalus 2.	One of the survivors is wife to No. 13, Class C; two of the survivors decidedly scrofulous.
3	1	2	..	..	..	..	..	..	..	..	..	..	..	..	Normal.
6	4	2	..	..	..	..	..	..	..	1	..	..	..	Dysentery.	Normal.
9	2	7	..	..	..	..	..	..	..	3	..	..	3 7 1	Scarlatina. Measles. Unknown.	Normal.
2	1	1	..	..	..	..	..	..	..	..	..	..	..	..	Normal.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.

CLASS E.—

PARENTS.							
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE.	
						M.	F.
120	M. F.	Nervous. Unknown.	Constitution not robust; intemperate habits.	Farmer.	1832	24	20
121	M. F.	Bilious. Nervous.	No report.	..	1845	28	20
122	M. F.	Bilious. Nervous.	No report.	..	1854	26	20
123	M. F.	Sanguine-nervous. Nervo-bilious.	Both good health and habits.	Farmer.	1845	Young.	
124	M. F.	Unknown. "	Both good health and habits.	Farmer.	1820	Young.	
125	M. F.	Sanguine-bilious. Sanguine-nervous.	Both good health and habits.	Farmer.	1815	Young.	
126	M. F.	Bilious. Nervous.	Both good health and habits.	Merchan.	1837	26	24
127	M. F.	Nervous. "	Both good health and habits.	Lawyer.	1842	21	21
128	M. F.	Bilious. "	Both good health and habits.	Merchant.	1833	28	22
129	M. F.	Sanguine-bilious. Sanguine-nervous.	Both good health and habits.	Physician.	1842	Young.	
130	M. F.	Sanguine-bilious. " "	Both good health and habits.	Farmer.	1854	Young.	
131	M. F.	Unknown. "	No report.	Mechanic.	—1835	Young.	
132	M. F.	Unknown. "	No report.	..	..	Young.	
133	M. F.	Unknown. "	No report.	..	..	Young.	
134	M. F.	Unknown. "	No report.	..	—1821	..	
135	M. F.	Lymphatic. Nervous.	Both good health and habits.	Merchant.	1840	26	24
136	M. F.	Bilious. Nervous.	Both good health and habits.	Machinist.	1828	28	26
137	M. F.	Nervous. "	Both good health and habits.	Merchant.	1833	25	24
138	M. F.	Sanguine-bilious. Bilious-nervous.	Both good health and habits.	Physician.	1849	Young.	
139	M. F.	Sanguine-bilious. " "	Both good health and habits.	Farmer.	1820	Young.	
140	M. F.	Nervo-sanguine.	Both healthy, vigorous constitutions, and good habits.	Merchant.	1853	Young.	
141	M. F.	Lymphatic. Sanguine.	Both healthy, with perfectly regular habits.	Physician.	1839	Young.	
142	M. F.	Bilious. "	Both healthy, with perfectly regular habits.	Of leisure (wealthy).	1830	Young.	
143	M. F.	Bilious. Lymphatic.	Both healthy, with perfectly regular habits.	Of leisure (wealthy).	1837	Young.	
144	M. F.	Nervous. "	Both good health and habits; the father is somewhat deaf.	Farmer.	1815	25	Young.
145	M. F.	Bilious. Nervous.	Both good health and habits.	Farmer.	1828	20	Young.
146	M. F.	Nervous. Lymphatic.	Both good health and habits.	Farmer.	1819	23	Young.
147	M. F.	Nervous. Sanguine.	Delicate health; good habits —Wife, good constitution; intemperate.	Farmer.	1832	26	Young.
148	M. F.	Bilious. Nervous.	Both healthy, with good habits.	Profession.	1836	30	23
149	M. F.	Nervous. "	Both good health; habits doubtful.	Merchant.	1827	20 to 30	20 to 30

First Cousins—Continued.

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
8	5	3	8	4	3	..	1	3	..	3	2	1	2 4 9	Convulsions. Phthisis. Spina bifida.	Two of the deaf mutes and one of the blind have also epilepsy, and one or more have curvature of the spine.
4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
2	1	1	..	..	..	..	..	..	..	..	..	..	..	..	Both living and normal.
3	..	3	2	2	..	..	..	..	..	..	..	..	..	..	
12	7	5	..	..	..	..	..	..	..	5	..	..	—7	Unknown.	All normal.
11	7	4	..	..	..	..	..	..	..	3	3	..	..	Unknown.	Remainder healthy.
6	1	5	..	..	..	..	..	..	..	1	..	..	2	Scarlatina.	Survivors unusually bright and healthy.
4	1	3	..	..	..	..	..	..	..	..	..	..	..	..	
5	3	2	5	..	..	1	..	..	..	4	..	..	—7	Convulsions.	The idiot survives, a female, æt. 17.
1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	Living and healthy.
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Normal.
9	..	..	3	3	..	..	..	..	..	3	..	..	..	Stillborn.	No account of survivors.
2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	No account of survivors.
5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	All healthy.
9	7	2	2	..	..	1	..	..	..	..	..	..	..	..	Two very defective; one is 32 years old and never spoke; one an idiot.
5	3	2	..	..	..	..	..	..	..	2	..	..	—7	..	Three unusually bright.
2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	Both bright and healthy.
6	2	4	3	..	..	1	1	..	1	1	..	..	..	..	Three last children normal.
6	3	3	..	..	..	..	..	..	..	4	3	1	—6	Croup 1. Meningitis 2.	
12	6	6	..	..	..	..	..	..	..	..	..	..	..	..	
2	1	1	2	..	1	..	..	..	..	1	..	..	..	Unknown.	The oldest was born blind and idiotic; the second and survivor is apparently normal in intellect, but is imperfectly developed, not larger than a two months' old child might be expected, although a year old.
6	3	3	..	..	..	..	..	..	..	1	..	..	9	Unknown.	The survivors are remarkable for good deportment.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
11	..	..	1	..	..	1	..	..	..	10	..	..	..	Scrofulous affections.	The only survivor is an idiot (addicted to drunkenness).
11	..	..	..	..	..	..	..	..	..	6	..	..	..	Scrofula and phthisis.	
3	1	2	3	..	..	..	..	..	3	1	..	..	24	Fever.	One female, supposed to have phthisis.
3	1	2	3	1	..	1	..	..	..	..	..	..	..	..	One a semi-mute.
6	3	3	1	..	..	1	..	..	..	1	..	..	6	Unknown.	The idiot died; survivors of average brightness.
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	Living and unusually bright.

CLASS E.—

PARENTS.						
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M. F.
150	M. F.	Choleric. "	Subject to rheumatism; irregular habits.—Wife, good health and habits. Both of good minds, but uneducated.	House-builder.	1837	Young.
151	M. F.	Sanguine. "	Both of good constitutions and habits; circumstances of life favorable to development of offspring.	Farmer.	1829	Young.
152	M. F.	Phlegmatic. "	Constitutions of both parents delicate, particular tendencies to disease not reported; habits and circumstances of life good.	Farmer.	1807	Young.
153	M. F.	Lymphatic. Nervous.	Both good health and habits.	Farmer.	1818	24 22
154	M. F.	Bilious. Nervous.	Both good health and habits.	Machinist.	1833	28 21
155	M. .	Lymphatic. Nervous.	Both good health and habits.	Farmer.	1846	27 24
156	M. F.	Bilious. Nervous.	Both good health and habits.	Merchant.	1833	26 20
157	M. F.	Nervous. "	Both good health and habits; male subject to depression of spirits.	Merchant.	1817	24 21
158	M. F.	Phlegmatic. "	Both good constitutions; father, very intemperate; mother, good habits. Parents are wealthy.	Farmer.	1832	Young.
159	M. F.	Sanguine. "	Both good constitutions and habits, are robust physically, but of dull minds; in easy, comfortable circumstances of life.	Farmer.	1825	Young.
160	M. F.	Sanguine. "	Both of good constitutions and habits; in humble circumstances of life, but laborious and intelligent.	Shoemaker.	1845	Young.
161	M. F.	Sanguine. "	Both good health and habits; intelligent; wealthy.	Farmer.	1840	Young.
162	M. F.	Phlegmatic. "	Both good health and habits; intelligent; in comfortable circumstances of life.	Farmer.	1842	Young.
163	M. F.	Nervous. Bilious.	Tuberculous; intemperate habits.—Wife, good constitution and habits.	Farmer.	1850	26 20
164	M. F.	Nervo-sanguine. Bilio-sanguine.	Both good health and habits.	Farmer.	—1835	Young.
165	M. F.	Lymphatic. Nervo-sanguine.	Healthy and good habits.—Wife, delicate health, good habits.	Farmer.	1817	Young.
166	M. F.	Unknown. "	Constitutions and habits of both parents good.	Farmer.	1827	Young.
167	M. F.	Unknown. "	No report of health or habits. The husband was of tall, gaunt form, and died ultimately of phthisis.	Clothier.	1749	Young.
168	M. F.	No report.	Good health and frame; red hair; lived to a great age.—Wife, good health; light hair; lived to a great age; niece to husband's father.	Blacksmith.	1776	23 22
169	M. F.	Unknown. "	Robust health and active habits.—Wife, active habits, but for some years showing symptoms of tuberculosis.	Farmer.	1842	Young.
170	M. F.	No report.	Both healthy and temperate.	Farmer.	1851	Young.
171	M. F.	Sanguine. Nervo-sanguine.	Athletic form and constitution; drunken and dissipated in habits.—Wife, good health and habits; quiet and religious.	Farmer.	1824	25 20

***First Cousins*—Continued.**

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
11	8	3	5	..	..	5	..	..	..	5	..	..	3 5 11 9 15	Convulsions. " " Dysentery, Typhoid fever.	The five idiots were all males; all the survivors who are not idiots are of dull minds except one.
9	3	6	..	..	..	..	..	..	..	..	..	..	..	..	All living and normal.
9	4	5	..	..	..	..	..	..	..	8	..	..	..	Consumption.	Ages at death not known; all arrived at puberty.
4	3	1	1	..	..	..	..	..	1	..	..	..	27	Rachitis.	Survivors intelligent.
3	2	1	1	..	..	1	..	..	1	1	..	..	—7	Convulsions.	
2	2	..	1	..	..	1	..	..	..	2	..	..	5 —7	Unknown. "	
8	5	3	4	..	..	2	1	..	1	1	..	..	—7	Convulsions.	Survivors of average brightness.
4	3	1	2	..	..	1	..	..	1	3	..	..	—7	Convulsions.	Eldest idiotic, and survives.
4	2	2	4	4	..	..	..	..	..	..	..	..	..	..	All living, and of bright minds.
6	4	2	1	..	1	..	..	..	..	..	..	..	..	..	All living, and of good constitutions.
6	3	3	..	..	..	..	..	..	..	1	..	..	9	Typhoid fever.	Survivors bright and quick to learn.
1	1	..	1	..	1	..	..	..	..	..	..	..	..	..	No other defect; bright in intellect.
4	1	3	..	..	..	..	..	..	..	..	..	..	..	..	All living, of good constitutions, and average intellect.
3	2	1	..	..	..	..	..	..	..	3	2	1	1 to 2	Tuberculosis.	
12	8	4	..	..	..	..	..	..	..	6	4	2	—7	Tuberculous affections.	
10	..	..	..	..	..	..	..	..	..	8	..	..	..	..	One of the survivors has phthisis.
9	5	4	3	..	3	..	..	..	..	..	..	..	..	..	Blindness due to congenital cataract.
5	2	3	..	..	..	..	..	..	..	..	..	..	..	..	None defective; all died at mature old age; causes unknown.
8	4	4	..	..	..	..	..	..	..	..	..	..	..	..	All good physical and mental endowments; one a member of Congress.
5	3	2	2	..	..	..	..	..	..	2	..	..	2 weeks.	Inanition from malformity of mouth.	The first and fifth, both females, had the soft palate wanting, the superior palatine and maxillary bones fissured, and the mouth and nose constituting one cavity; this deformity prevented their nursing; survivors physically of good form, but mentally, inferior to parents.
3	1	2	..	..	..	..	..	..	..	..	..	..	..	..	All healthy and perfectly formed; too young to make any statement respecting their mental endowments.
10	6	4	4	..	..	3	..	1	..	2	..	1	20	Puerperal peritonitis.	The children are all of scrofulous diathesis; all ignorant, and the sons drunkards.

CLASS E.—

PARENTS.							
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	AGE AT MARRIAGE. F.
172	M. F.	Bilious. Nervo-sanguine.	Both good health and habits; male, good physique, light-brown hair; female, good physique, very light hair and eyes, niece to husband's father.	Farmer.	1836	25	21
173	M. F.	Sanguine-nervous. Nervous.	No report of health or habits, but from characteristic carefulness of the contributor, presume any existing irregularities would have been mentioned.—Wife died at 35 of phthisis; was niece to husband's mother.	Farmer.	1832	23	23
174	M. F.	Bilious. Nervo-sanguine.	Feeble constitution; regular habits; stupid, indolent, and good humored.—Wife, robust health, athletic form; industrious habits.	Farmer and herb doctor	1825	27	23
175	M. F.	Lymphatic. "	Good constitution and form; dark hair.—Wife, very fat, dark hair; niece to husband's father.	Farmer.	1835	30 to 40	
176	M. F.	Lymphatic. Nervous.	Good constitution, robust frame; irregular habits.—Wife, good constitution; good habits; religious.	Lawyer.	1845	25	25
177	M. F.	Bilio-lymphatic. Unknown.	Both parents robust health, and large frames; good habits; highly intellectual and cultivated.	Farmer.	1834	32	25
178	M. F.	Bilious-phlegmat. Nervous.	No report. Wife niece to husband's father.	..	1833	26	25
179	M. F.	Unknown. "	No report. Wife niece to husband's mother.	Carpenter.	1817	Young.	
180	M. F.	Bilious. "	No report. Wife niece to husband's mother.	Farmer.	1854	22	21
181	M. F.	Unknown. "	Both believed to be of good constitutions and habits.	Farmer.	1842	Young.	
182	M. F.	Bilious. "	Both good health and habits; male, tall and slim, brown hair; female, good proportions, dark hair, niece to husband's father.	Millwright.	1838	Young.	
183	M. F.	Bilious. Nervous.	No report of health and habits. Wife, niece to husband's father.	Farmer.	1839	Young.	
184	M. F.	Unknown. "	Both good health and habits.	Blacksmith.	1834	23	23
185	M. F.	Unknown. "	Both good health and habits.	Clergyman.	1845	22	22
186	M. F.	Unknown. "	Both good health and habits.	Farmer.	1800	25	25
187	M. F.	Unknown. "	Both good health and habits.	Farmer.	1790	22	22
188	M. F.	Nervo-bilious. Sanguino-lymph.	Both good health and habits.	Clerk.	1841	25	..
189	M. F.	Bilious. Nervo-lymphatic.	Both good health and habits.	Farmer.	1847	25	23
190	M. F.	Nervous. Nervo-sanguine.	Delicate health; intemperate habits.—Wife, ordinarily good health, not robust; good habits.	Mechanic.	1854	24	24
191	M. F.	Nervous. Lymphatic.	Both good health and habits.	Farmer.	1845	22	22
192	M. F.	Bilio-sanguine. "	Good constitution; intemperate habits.—Wife, good health and habits; niece to husband's mother.	Farmer.	1850	26	..
193	M. F.	Unknown. "	No report of health and habits.	..	1841	..	..
194	M. F.	Unknown. "	No report of health and habits.	..	1840	..	..

First Cousins—Continued.

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
5	3	1	..	..	..	..	..	..	..	1	..	..	..	Stillborn from fall of mother.	Survivors normal.
5	..	..	..	..	..	..	..	..	..	3	..	..	..	..	Cause of death not certainly known; one or more were stillborn; all three died in infancy.
9	5	4	9	..	1	3	..	..	..	3	1	2	..	Cholera infantum.	Survivors mentally weak.
5	..	2	..	..	..	..	..	..	..	..	..	..	..	..	No defects.
3	1	2	3	..	..	..	..	..	3	..	..	..	..	..	
7	..	..	3	..	..	3	..	..	3	2	..	..	..	Scrofula.	All of weak intellect compared with parents.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
2	1	1	..	..	..	..	..	..	..	1	..	..	3 mos.	Overlaid by mother.	Twins, and sprightly children.
7	5	2	4	..	4	..	..	..	..	1	..	..	..	Unknown.	The first case of blindness which occurred in this family was referred by the parents to scarlatina, the succeeding cases were ascribed to maternal emotion.
5	2	3	..	..	..	..	..	..	..	4	..	..	..	Killed by accident 1. Starved by ignorant nurse 1.	Survivor normal.
9	2	7	..	..	..	..	..	..	..	..	..	..	..	..	Normal.
6	6	..	..	..	..	..	..	..	..	1	1	..	3	Unknown.	Normal.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
9	6	3	3	..	..	1	2	..	..	..	..	..	..	..	
6	4	2	..	..	..	..	..	..	..	3	..	..	28 to 40	Fever 2. Consumption 1.	
3	3	..	..	..	..	..	..	..	..	..	..	..	..	..	All healthy and intelligent.
5	2	3	..	..	..	..	..	..	..	..	..	..	..	..	All healthy and intelligent.
1	1	..	1	..	..	..	..	1	..	..	..	..	..	..	Subject to convulsions from birth.
4	2	2	4	..	..	..	..	..	4	..	..	..	..	..	
4	1	3	..	..	..	..	..	..	..	..	..	..	..	..	
4	..	..	2	2	..	..	..	..	..	..	..	..	..	..	The two eldest, a boy and girl, are the mutes; no cause known in their circumstances of life to interfere with development of offspring.
2	1	1	2	..	..	1	..	..	..	..	..	..	..	..	The eldest, a female, is the idiot; she is harmless and inoffensive, spending her time in gathering fragments of pottery and stones. The boy has a deformed leg, and is unable to walk without grasping his thigh.

CLASS E.—

PARENTS.						
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M. F.
195	M. Bilious. F. Nervous.	Robust health and good habits.—Wife, strumous; good habits; is thought to have been the subject for some years of a very small epithelial cancer.	Farmer.	1835	Young.	
196	M. Nervous. F. Sanguine.	Both good health and habits.	Merchant.	1830	Young.	
197	M. Phlegmatic. F. Nervous.	Both good health and habits.	Physician.	1829	Young.	
198	M. Bilious. F. Nervous.	Both more than ordinarily healthy and active.	Farmer.	1853	Young.	
199	M. Unknown. F. "	Both healthy and robust.	..	1830	Young.	
200	M. Unknown. F. "	No report of health or habits, may be supposed to be usually good, as no irregularities are mentioned.	Stonemason.	1827	Young.	
201	M. Unknown. F. "	No report of health; husband intemperate.	..	1830	..	..
202	M. Sanguine. F. Lymphatic.	Both good health and habits.	Farmer.	1847	28	21
203	M. Sanguine. F. Nervo-lymphatic.	Both good health and habits.	Farmer.	1847	25	20
204	M. Bilious. F. Sanguine.	Both good health and habits.	Farmer.	1827	25	25
205	M. Unknown. F. "	Both parents healthy, with good habits, and lived to old age; husband paraplegic for some years before death.	Farmer.	1790	Young.	
206	M. Unknown. F. "	Both ordinarily healthy, with good habits; mother bore twins twice.	Farmer.	1837	Young.	
207	M. Unknown. F. "	Both healthy and active; the wife died young.	Farmer.	—1835	Young.	
208	M. Unknown. F. "	Both healthy, and free from hereditary taint.	Farmer.	—1835	Young.	
209	M. Sanguine nervous. F. Nervo-lymphatic.	Not of robust health; habits good.—Wife, good health and habits.	Farmer.	1837	25	25
210	M. Bilious. F. Lymphatic.	Both good health and habits.	Farmer.	1837	25	25
211	M. Sanguine. F. "	Both good health and habits.	Farmer.	1841	25	23
212	M. Sanguine. F. Nervous.	Both good health and habits.	Clerk.	1851	38	29
213	M. Sanguine. F. "	Both good health and habits. Separated after birth of their first child, believing it to be wrong to live together.	Merchant.	1844	Young.	
214	M. Sanguine. F. Nervous.	Both good health and habits.	Farmer.	1807	Young.	
215	M. Unknown. F. "	Both healthy, vigorous constitutions; good habits; dull minds.	..	—1835	21	21
216	M. Unknown. F. "	Both healthy, vigorous constitutions; good habits.	..	1828	25	20
217	M. Unknown. F. "	Both healthy, vigorous constitutions; good habits.	..	1830	20	20
218	M Unknown. F. "	Both healthy, vigorous constitutions; good habits.	..	1854	27	27

***First Cousins*—Continued.**

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	Normal.
2	1	1	..	..	..	..	..	..	..	..	..	..	..	..	Normal.
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	Normal.
8	..	..	3	..	..	..	..	..	..	..	..	..	..	..	Three cross-eyed; all inferior to parents in intelligence.
8	5	3	6	5	..	1	..	..	..	6	..	..	1 to 5	Poisoned 3. Unknown 3.	The two survivors are sickly, and below mediocrity in intellect.
3	..	..	3	..	3	..	..	..	..	..	..	..	..	..	The blindness from amaurosis.
2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	Both healthy and intelligent.
1	1	..	..	..	..	..	..	..	..	1	1	..	..	Stillborn.	
8	8	..	..	..	..	..	..	..	..	..	..	..	..	..	All living, healthy, and intelligent.
6	1	5	3	..	..	1	2	..	..	..	..	..	..	..	Two died of phthisis; two insane at from 25 to 40; the two survivors below either parent in mental capacity.
13	10	3	1	..	..	..	..	..	1	6	6	..	..	Tabes mesenterica.	One of the survivors is active and sprightly, the others all inferior to parents in intellect, and all have rough unattractive features, and dull sluggish habits.
2	..	..	..	..	..	..	..	..	..	1	..	..	..	Unknown.	Survivors healthy and normal.
5	..	..	..	..	..	..	..	..	..	2	..	..	..	Erysipelas 1. Unknown 1.	Survivors small and deficient in physical development; intellect about ordinary.
2	1	1	1	..	..	..	..	1	..	1	..	1	2	Scarlatina.	Both were healthy and intelligent until the incursion of scarlatina, which left the survivor deaf and subject to epileptic convulsions.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
4	3	1	..	..	..	..	..	..	..	..	..	..	..	..	All living, healthy, and intelligent.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	Born malformed; the precise nature of the deformity the contributor had not been able to learn.
2	1	1	..	..	..	..	..	..	..	..	..	..	..	..	Both living, aged 40 and 45; the son stammers very badly, and is compelled to sing all his conversation; daughter normal.
5	..	..	2	..	..	2	..	..	..	3	..	..	..	Unknown.	The survivors are a male and female; the former idiotic, the latter of ordinary intellect but physically weak.
4	1	3	..	..	..	..	..	..	..	1	..	1	20	Chronic diarrhœa.	Survivors healthy and physically well developed; but the son and one daughter are mentally far inferior to their parents.
5	4	1	..	..	..	..	..	..	..	..	..	..	..	..	All living and equal in intellectual and physical development to their parents.
1	..	..	1	..	..	1	..	..	..	..	..	..	..	..	Suffers in an extraordinary manner with constipation, so that it is not likely to survive long.

CLASS E.—

PARENTS.						
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M. F.
219	M. F.	Nervous. Bilious.	Both healthy, vigorous constitutions; good habits.	Farmer.	1803	Young.
220	M. F.	Unknown. "	Both healthy and athletic; habits good.	Farmer.	1830	Young.
221	M. F.	Nervo-sanguine. Unknown.	Robust health and good habits. Separated after birth of child, or rather after its death.	Merchant.	1845	.. ..
222	M. F.	Nervo-sanguine. Unknown.	Same male as in No. 221. Female, delicate health; sister to female in No. 221, and scrofulous.	Merchant.	1847	.. ..
223	M. F.	Unknown. "	Both good health and habits.	Farmer.	1820	.. ..
224	M. F.	Sanguine. Bilious.	Both good health and habits.	Farmer.	1843	41 35
225	M. F.	Sanguine. Lymphatic.	Good health; intemperate.—Wife, feeble health.	Farmer.	1822	21 19
226	M. F.	Sanguine. Lymphatic.	Good health; intemperate; brother to male No. 225.—Wife, feeble health; sister to female No. 225.	Farmer.	1822	Young.
227	M. F.	Unknown. "	Vigorous health and good habits.	Farmer.	—1835	Young.
228	M. F.	Unknown. "	Vigorous health and good habits.	Farmer.	—1835	Young.
229	M. F.	Unknown. "	Vigorous health and good habits. Both died of phthisis, aged 65 or 70.	Farmer.	1800	Young.
230	M. F.	Bilious-lymphatic. Bilious.	Both good health and habits. Same male as in No. 50, Class F.	Carpenter.	1840	23 20
231	M. F.	Nervous-sanguine. Bilious.	Both ordinarily good health and habits; husband has been dropsical for last four years.	Farmer.	1841	22 19
232	M. F.	Sanguine. Lymphatic.	Robust health; good habits; stammers badly, no other defect.—Mother has rather bad health, suffered during gestation with ophthalmia.	Farmer.	1853	24 19
233	M. F.	Sanguine. Lymphatic.	Both good health and habits.	Farmer.	1850	26 22
234	M. F.	Phlegmatic. "	Both good constitution; steady habits; husband's father was brother to his wife's mother.	Farmer.	1817	Young.
235	M. F.	Phlegmatic. Bilious.	Both good constitution and habits; husband's father was brother to his wife's mother. Males of Nos. 234 & 235 were brothers, and females sisters.	Farmer.	1817	Young.
236	M. F.	Nervo-sanguine. Unknown.	Both robust; regular habits.	Farmer.	—1835	Young.
237	M. F.	Nervo-sanguine. "	Both ordinary health; regular habits.	Various.	1842	25 ..
238	M. F.	Phlegmatic. Nervous.	Both good health and habits.	Merchant.	1827	Young.
239	M. F.	Bilious. Sanguine.	Both good health and habits.	Farmer.	1817	Young.

First Cousins—Continued.

CHILDREN.																
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
5	3	2	1	..	..	..	..	..	..	..	..	..	..	..	All living from 35 to 50 years of age; one is deaf, and speaks like a young child; one is badly asthmatic; others normal. They have married into healthy families not related, yet several of their children have died of phthisis, others manifest that tendency.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
1	..	1	1	..	..	..	..	..	..	1	..	..	2 mos.	Inanition.	The first was imperfectly developed, the second (222) is afflicted with ulcerations probably scrofulous.
1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	
13	..	..	3	..	3	1	..	..	..	6	..	..	..	Unknown.	The eyes are faulty in configuration.
2	..	2	1	..	..	..	..	..	..	1	1	..	6 weeks.	"Defective navel."	Survivor intelligent and healthy.
3	2	1	..	..	..	..	..	..	..	..	..	..	..	..	These children should not be termed idiots, but lack intelligence.
3	..	3	..	..	..	..	..	..	..	..	..	..	..	..	One has a peculiar formation of the ear, otherwise there are no physical defects; in intellect they are as children of No. 225.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Never had any living children, but miscarried three or four times at seventh month.
3	1	2	..	..	..	..	..	..	..	..	..	..	..	..	Exhibit evidences of inferiority to their parents; intellect ordinary.
8	6	2	..	..	..	..	..	..	..	6	..	..	..	Consumption 3. Acute diseases 2. Killed 1.	All arrived at puberty before death; survivors normal.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	No children, two miscarriages at seventh month; soon after the last of which the mother died of fever.
4	3	1	..	..	..	..	..	..	..	..	..	..	..	..	The oldest was strabismic, otherwise they are perfectly developed mentally and physically
1	1	..	1	..	..	..	..	..	1	..	..	..	..	..	The child is also apparently idiotic; but the contributor does not confidently impute this to influence of consanguinity, as the mother is also of feeble intellect.
4	2	2	..	..	..	..	..	..	..	..	..	..	..	..	All living, no defects.
15	13	2	..	..	..	..	..	..	..	11	..	..	..	..	All the survivors are in rather ill health; those who died, died for the most part before maturity.
8	3	5	..	..	..	..	..	..	..	1	..	..	2	Unknown.	Nothing unusual about survivors.
3	2	1	1	..	..	1	..	..	..	2	1	1	—15	..	Survivor is fifteen, sprightly and healthy.
2	..	2	2	..	..	..	..	..	2	..	..	..	..	..	Both sprightly intellectually, but have enlargements of cervical glands, and other indications of scrofula.
5	3	2	..	..	..	..	..	..	..	1	..	..	..	Stillborn.	Survivors normal.
2	..	2	..	..	..	..	..	..	..	2	..	..	..	Stillborn.	

CLASS E.—

PARENTS.						
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE.
						M. F.
240	M. F.	Sanguine. Nervous.	Constitution and habits good; husband's mother was sister to wife's father.—Wife, delicate health; good habits; had many miscarriages.	Farmer (retired merchant.)	1812	Young.
241	M. F.	Unknown. "	Both good health and habits; both of excellent mental and physical endowment.	Farmer.	—1835	25 18
242	M. F.	Unknown. "	No report of health or habits.	Farmer.	—1835	.. ..
243	M. F.	Melancholic. Sanguine.	Rather delicate constitution; good habits.—Wife, low in stature, but well formed; good health. Parents very dissimilar in form, temperament, and features.	Physician and farmer.	1838	Young.
244	M. F.	Nervous. Phlegmatic.	No report of constitution or habits.	Editor.	1854	Young.
245	M. F.	Nervous. Phlegmatic; melancholy.	Both good health and habits. A strong family likeness exists between the parents; wife previously married to husband not related, and bore one healthy child.	Farmer.	1842	Young.
246	M. F.	Unknown. "	Both remarkable for activity, energy, and superior intelligence; husband has filled several important and responsible offices.	..	—1835	Young.
247	M. F.	Unknown. "	Both of good health and habits, and favorable circumstances of life.	..	—1830	Young.
248	M. F.	Unknown. "	Both of strong physical and mental development; wife had previously married a man not related, by whom she bore five well-formed and sprightly children.	..	—1835	Young.
249	M. F.	Unknown. "	No report of health or habits.	Manufacturer.	1817	Young.
250	M. F.	Unknown. "	Both good health and habits.	..	1800	Young.
251	M. F.	Unknown. "	Both good health and habits.	..	1800	Young.
252	M. F.	Unknown. "	Both parties apparently healthy.	Physician.	1842	30 20
253	M. F.	Unknown. "	Both healthy, with strongly marked individualities and strong mental capacities. Female, sister to female of No. 252.	Farmer.	1836	21 21
254	M. F.	Unknown. "	Healthy; good habits.—Wife, delicate constitution.	Lawyer.	1830	Young.
255	M. F.	Unknown. "	Both good health and habits.	..	1826	Young.
256	M. F.	Unknown. "	Both healthy in every respect; good habits.	..	—1835	Young.
257	M. F.	Unknown. "	Both good health and habits.	Farmer.	1820	Young.
258	M. F.	Unknown. "	Both good health and habits. Male had previously married two wives, whether fruitful or not is not reported.	Farmer.	1827	.. ..
259	M. F.	Unknown. "	Both good health and habits.	..	—1820	Young.
260	M. F.	Unknown. "	Both good health and habits.	..	—1820	Young.
261	M. F.	Unknown. "	Both healthy and regular habits.	Farmer.	1807	Young.
262	M. F.	Unknown. "	Both healthy and regular habits.	Farmer.	1835	Young.

First Cousins—Continued.

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN. REMARKS, ETC.
8	2	6	..	..	..	..	..	..	..	1	..	..	..	..	The two males small in size, but should scarcely be called dwarfs.
6	5	1	..	..	..	..	..	..	..	..	..	..	..	..	All living, and without notable defects; the daughter is not comely, and none of the offspring are equal, mentally or physically, to their parents.
3	..	3	2	..	2	..	..	..	..	..	..	..	..	..	Congenital cataract.
8	5	3	..	..	..	..	..	..	..	1	..	..	—5	Inflammatory.	Survivors are of good constitution, sound intellect, and some of them above mediocrity in latter respect.
2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Diminutive, but sprightly.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
8	..	..	6	..	..	6	..	..	..	..	..	..	..	..	
4	..	..	..	..	..	..	..	..	..	3	..	..	—5	Unknown.	Survivor is now an adult and normal; those who died were of diminutive size, badly developed.
3	..	..	3	..	..	..	..	..	..	..	..	..	..	..	Remarkable for diminutive proportions and mental imbecility.
11	6	5	..	..	..	..	..	..	..	3	3	..	—1 4 14	Unknown. Dysentery. Killed by accident.	One daughter strabismic; the oldest married and bore 3 children, then died of abscess of cerebellum; another daughter married her sister's husband, but is without issue.
1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	Normal; married and has several children.
4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	All healthy and bright.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Fair health and habits, but none of them equal to parents.
4	..	..	..	..	..	..	..	..	..	4	..	..	—3 —20	Unknown.	
6	6	..	..	..	..	..	..	..	..	..	..	..	..	..	All living and healthy.
8	..	..	1	..	..	1	..	..	..	..	..	..	..	..	
4	..	..	..	..	..	..	..	..	..	3	..	..	..	..	Two died in infancy, one at 25. The living child is not bright.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
3	2	1	..	..	..	..	..	..	..	..	..	..	..	..	None defective, either physically or mentally.
4	3	1	4	..	..	..	..	..	..	..	..	..	..	..	All deficient in intellect, but not complete idiots.
5	2	3	..	..	..	..	..	..	..	..	..	..	..	..	All grew up healthy and strong.
5	3	2	..	..	..	..	..	..	..	1	..	..	—5	..	Survivors active and healthy.

CLASS E.—

Number of observations.	Sex of parents in reference to.	PARENTS. TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M. F.
263	M. F.	Unknown. "	Both healthy and regular habits; male of light complexion, female brunette.	Laborer.	1852	Young.
264	M. F.	Unknown. "	Not robust; both died of phthisis, age not stated.	Merchant,	1820	Young.
265	M. F.	Unknown. "	Both good health and habits.	..	1805	Young.
266	M. F.	Unknown. "	Both good health and habits.	Farmer.	1802	Young.
267	M. F.	Unknown. "	No report of health and habits.—Wife, strumous.	Merchant.	1842	Young.
268	M. F.	Unknown. "	Both good health and habits.	Farmer.	1817	Young.
269	M. F.	Unknown. "	Both good health and habits.	Manufacturer.	1840	Young.
270	M. F.	Unknown. "	Both good health and habits.—Male previously married to a woman not related.	Farmer,	1790	.. ..
271	M. F.	Unknown. "	Both good health and habits, and with no constitutional peculiarities, or other surrounding circumstances likely to affect integrity of offspring.	..	1820	Young.
272	M. F.	Unknown. "	Both healthy and of good bodily development, and average intellectual endowment; wealthy, and good habits.	Farmer.	1836	Young.
273	M. F.	Unknown. "	Both healthy in every respect.	..	—1835	Young.
274	M. F.	Nervo-bilious. "	Both good health and habits; male died early, and the widow marrying a man not related had three sprightly, well-formed children.	..	—1835	Young.
275	M. F.	Phlegmatic and stupid. " "	Both ordinary health, but very regular habits.	Farmer.	1846	30 30
276	M. F.	Unknown. "	Both good health and habits; the female had hare-lip.	Farmer.	1843	22 20
277	M. F.	Sanguine. "	Father, very robust; mother, average health; both good habits and intellectual. These parents do not know of any scrofula, or other hereditary taint in their families.	Farmer.	—1835	Young.
278	M. F.	Bilious. Sanguine.	Good health and habits.—Wife, delicate; good habits. No hereditary taint in families; no scrofula ever manifested.	Farmer.	—1835	Young.
279	M. F.	Phlegmatic. "	Both delicate health; good habits; no scrofula known of in family, and both lived to a great age.	Farmer.	—1835	Young.
280	M. F.	Unknown. "	Both good health and habits.—Wife died after the birth of seventh child, and the husband married a woman not related, who bore him three or four sprightly, fine looking children.	..	—1835	Young.
281	M. F.	Phlegmatic. "	Both good health and habits.	Farmer.	—1835	Young.
282	M. F.	Unknown. "	Both good health and habits.	Farmer.	1832	Young.
283	M. F.	Unknown. "	Both good health and habits.	Farmer.	1812	Young.

First Cousins—Continued.

CHILDREN.																
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
3	1	2	1	..	..	..	..	1	..	1	..	..	—3	Hydrocephalus.	Youngest child has convulsions.
2	2	..	..	..	..	..	..	..	..	2	..	..	—18	Phthisis.	
6	2	4	..	..	..	..	..	..	..	..	..	..	..	..	All healthy and bright.
1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	Delicate but bright and active; married a cousin, see Class C, No. 16.
4	1	3	1	..	..	..	..	..	1	..	..	..	..	..	Oldest daughter scrofulous, others healthy.
4	2	2	..	..	..	..	..	..	..	..	..	..	..	..	All bright and healthy.
1	..	1	..	..	..	..	..	..	..	1	..	1	2	Diarrhœa.	No other children born since.
11	5	6	..	..	..	..	..	..	..	1	1	..	—5	Unknown.	Several of the survivors are rather odd and are not considered of average intellect, or equal to the children of the same father by his subsequent marriage.
4	..	..	1	..	..	1	..	..	..	3	..	..	—5	Unknown.	The oldest child, a male, was born with a head of unusual dimensions, has now grown to manhood, with a head of the same disproportionate size, was subject to convulsions in early life.
9	..	..	3	3	..	..	..	..	..	..	..	..	..	..	The mutes are of good minds (2 males and 1 female); the other children are well formed and sprightly.
8	..	..	1	..	..	1	..	..	..	1	..	..	1	..	The idiot affected with feeble convulsions until its death. The remainder normal.
3	2	1	1	..	..	1	..	..	..	..	..	..	..	..	The daughter well endowed, is married and has one child; one son is also of good intellect and physical development.
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Still young, but with no perceptible defect.
6	..	..	3	..	..	..	..	..	..	3	..	..	—2	Convulsions.	One of the children that died and two of the survivors have hare-lip.
6	2	4	2	..	..	..	..	..	2	1	..	1	18	Phthisis.	One of the survivors has strumous ophthalmia, the others normal.
10	2	8	1	..	..	..	..	..	1	2	..	..	..	Unknown.	The scrofulous child is badly affected, the remaining seven are healthy unusually intelligent women. Three are married and have children.
8	3	5	1	..	..	..	..	..	1	..	..	..	..	..	All easy, quiet, good natured, without energy or force of character.
7	..	..	7	..	..	..	..	..	..	..	..	..	..	..	All grown, *very dull*, scarcely superior to complete idiots; weak-eyed and cross-eyed.
9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Fully equal to parents, both physically and mentally.
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	Twenty-two years old, no defects.
11	7	4	4	..	4	..	..	..	..	1	..	..	..	Unknown.	Congenital cataract the cause of blindness.

CLASS E.—

PARENTS.							
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	AGE AT MARRIAGE. F.
284	M. F.	Unknown. "	Both good health and habits. The male, after death of his wife, married female of No. 285. Female is sister to female of No. 285; died after bearing four children.	Farmer.	—1835	Young.	
285	M. F.	Unknown. "	Same male as in No. 284; married a sister of his first wife, and after her death married a woman not related, who bore him two children without defect.—Wife, good health and habits; sister to female No. 284.	Farmer.	..	..	..
286	M. F.	Bilious. Nervous.	Both good constitutions, and regular habits.	Farmer.	1836	25	24
287	M F.	Sanguine. Bilious.	Both of strumous diathesis.	Blacksmith.	1828	22	23
288	M. F.	Nervous. Bilious.	Both of strumous diathesis; habits regular.	Farmer.	1817	22	20
289	M. F.	Bilious. Sanguine.	Good health and habits.—Wife, frail health, tendency to tuberculosis. Second marriage of both parties.	Mariner.	1845	34	32
290	M. F.	Sanguine. Bilious.	Both good health, and active habits; male, intemperate.	Carpenter.	1835	27	24
291	M. F.	Bilious. "	Both good health and habits; female, niece to male's father.	Merchant.	—1835	..	..
292	M. F.	Nervo-bilious. Nervous.	Both spare make, of ordinary health; male, dyspeptic for two past years, lives well, is social but temperate; female, subject to nervous headache.	Farmer.	1833	22	20
293	M. F.	Phlegmatic. Nervous.	Robust and fleshy; a good liver, but temperate.—Wife, spare make; ordinary health; subject to attacks of hysteria.	Accountant.	1836	21	18
294	M. F.	Unknown. "	Both good health and habits; male died after birth of a child.	Farmer.	..	30	24
295	M. F	Unknown. "	Both good health and habits.	Farmer.	1847	35	35
296	M. F.	Unknown. "	Both good health and habits.	Farmer.	1827	25	25
297	M. F.	Lymphatic. Unknown.	Eminently scrofulous.—Wife, no report of health or habits.	Manufacturer.	1848	37	20
298	M. F.	Sanguine nervous. " "	Both healthy, but not robust.	Tailor.	1820	29	29
299	M. F.	Unknown. "	Both healthy.	Farmer.	—1835	..	..
300	M. F.	Unknown. "	Both supposed to be healthy.	Farmer.	—1835	..	..
301	M. F.	Sanguine. Nervous.	Both excellent health, and good habits.	Farmer.	1822	Young.	
302	M. F.	Unknown. "	Both good health and habits.	Clergyman.	1832	Young.	
303	M. F.	Bilious. "	Both good health and habits.	Farmer.	1843	Young.	
304	M. F.	Unknown. "	Both good health and habits.	Farmer.	1803	Young.	
305	M. F.	Nervous.	Not robust; male strumous, and female frail.	Physician.	1843	Young.	
306	M. F.	Bilious. Phlegmatic.	Both are healthy and normal in every respect, have fair intellect, and regular habits.	Farmer.	1823	Young.	
307	M. F.	Nervous. "	Male is healthy; female is in a lunatic asylum; cause of insanity not known.	Merchant.	1837	Young.	
308	M. F.	Bilious. "	Both of ordinary health; no scrofulous taint believed to be present.	Farmer.	1843	Young.	
309	M. F.	Bilious. Nervous.	Both of good health and habits, and possessed of fair intelligence.	Farmer.	1832	Young.	
310	M. F.	Nervous. "	Both good health and habits, and above mediocrity in intellect.	Lawyer.	1822	Young.	

First Cousins—Continued.

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
4	4	..	3	3	..	1	..	..	..	..	..	..	..	..	
1	..	..	..	..	..	..	..	..	..	1	..	..	22	..	With no peculiarity.
5	2	3	4	1	..	..	..	..	3	1	..	1	3	Marasmus.	The mute is intelligent, and some others are normal and healthy.
7	6	1	3	..	..	1	..	1	..	1	1	..	2	Hydrocephalus.	One male had club-foot, others normal and healthy.
9	6	3	5	1	..	..	..	..	4	1	1	..	22	Typhoid fever.	The mute died.
5	4	1	1	..	..	..	..	..	1	..	..	..	..	..	Remainder healthy.
6	3	3	2	..	..	2	..	..	..	1	..	1	4	Convulsions.	Survivors enjoy ordinary health.
5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Bright in intellect, healthy, and well formed physically.
13	7	6	..	..	..	..	..	..	..	4		1	4 mos.	Spina bifida.	None exhibit mental proficiency; some are rather dull, yet none are badly defective; all are pale, slender, and of unhealthy appearance.
											1		8 "	Laudanum.	
											1		16 "	Dentition.	
											1		10	Heart disease.	
10	6	4	2	2	..	..	..	..	..	1	1	..	1	Dentition.	Children are generally dull, pale, and thin, with a bad form and carriage; the mutes are male and female.
1	..	..	..	..	..	..	..	..	..	1	..	..	5	Croup.	This child was very intelligent.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
4	..	..	..	..	..	..	..	..	..	3	..	..	5 6 mos.	Hydrocephalus 2. Scarlatina 1.	
8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	All healthy; youngest 8 years old.
5	..	..	5	..	5	..	..	..	..	..	..	..	..	..	Cause of blindness not reported.
9	2	7	7	..	..	7	..	..	..	..	..	..	..	..	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
5	3	2	..	..	..	..	..	..	..	..	..	..	..	..	All living and normal.
3	3	..	..	..	..	..	..	..	..	..	..	..	..	..	All living and normal.
4	4	..	4	..	..	..	..	..	..	..	..	..	..	..	Two have hare-lip; all evidently scrofulous and of mediocre intellect.
10	5	5	5	..	..	5	..	..	..	..	..	..	..	..	Five are completely idiotic; the others partial.
3	1	2	2	..	..	2	..	..	..	..	..	..	..	..	The oldest daughter is a perfect idiot; the next daughter partial; the son normal.
1	1	..	1	..	..	..	..	..	..	1	1	..	1	Tabes mesenterica	Was unhealthy from birth.
1	1	..	1	..	..	1	..	..	..	..	..	..	..	..	Now 23 years old, and a complete idiot.
7	3	4	..	..	..	..	..	..	..	..	..	..	..	..	All below mediocrity in intellect.

CLASS E.—

PARENTS.							
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	F.
311	M. Nervous. F. Sanguine.	Not of vigorous health, but average.	Mechanic.	1848	Young.		
312	M. Unknown. F. "	Both good health and habits.	Farmer.	1822	Young.		
313	M. Unknown. F. "	Both of strumous diathesis.	Farmer.	1831	Young.		
314	M. Unknown. F. "	Both of strumous diathesis; male has phthisis.	Bookkeeper.	—1835	Young.		
315	M. Unknown. F. "	Both of good health and habits.	Farmer.	1832	Young.		
316	M. Unknown. F. "	Both of good health and habits.	Farmer.	1830	Young.		
317	M. Sanguine. F. "	Both good health and regular habits; were children of a brother and sister.	Farmer.	—1835	Young.		
318	M. Sanguine. F. Unknown.	Both good health and regular habits; were children of a brother and sister.	Farmer.	—1835	25	23	
319	M. Nervous. F. Unknown.	Consumptive. Both were brothers' children.	Merchant.	—1835	40	35	
320	M. Sanguine. F. Unknown.	Both good health and habits; children of a brother and sister.	Farmer.	—1835	..	..	
321	M. Sanguine-nervous. F. Unknown.	Both good health and habits; were descendants of two sisters.	Farmer.	1843	39	25	
322	M. Unknown. F. "	Both good health and habits.	Farmer.	1849	52	43	
323	M. Unknown. F. "	Health not reported; male is intemperate, and is not of vigorous mind: were children of a brother and sister.	..	—1835	Young.		
324	M. Unknown. F. "	Both good health and habits; after bearing four children, female died, and husband married her sister.	..	—1835	Young.		
325	M. Unknown. F. "	Same male as in No. 324.—Female, sister to female No. 324.	..	..	..	..	
326	M. Bilio-lymphatic. F. Lymphatic.	Good constitution, and regular habits.—Wife, not robust; regular habits.	Miller.	1825	30	22	
327	M. Unknown. F. "	Male, good constitution; female, strumous. The parties to Nos. 326 & 327, Class E, and No. 61, Class F, are of the same parentage, and no idiocy or similar defects existed in the family as far back as its history was known.	Laborer.	1830	21	23	
328	M. Sanguine. F. Lymphatic.	Good constitution; irregular habits.—Wife, feeble constitution.	Physician.	1823	32	24	
329	M. Sanguine. F. Nervous.	Both good health and habits.	Merchant.	1856	31	19	
330	M. Bilious nervous. F. Leucophlegmatic.	Both good health and habits.	Mechanic.	1849	22	22	
331	M. Unknown. F. "	"Bad habits."—Wife, good habits.	Innkeeper.	1826	19	18	
332	M. Unknown. F. "	Both good health and habits.	Merchant.	1854	Young.		
333	M. Nervous. F. Sanguine,	Good health and habits.—Wife, strumous.	Clergyman.	1837	Young.		
334	M. Nervo-sanguine. F. "	Strumous.—Wife, good constitution.	Bookkeeper.	1849	Young.		

First Cousins—Continued.

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
3	2	1	..	..	..	..	..	..	..	..	..	..	..	..	All below mediocrity in intellect.
7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	All healthy and normal.
7	..	..	3	..	..	..	..	..	3	4	..	..	..	Hydrocephalus 2. Dropsy 1. Scarlatina 1.	The living children are scrofulous and subject to swelling and inflammation of glands.
3	..	..	2	..	..	..	..	..	2	2	..	..	..	Hydrocephalus 2. Tuberculosis 1.	
5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	All healthy.
5	..	..	1	..	..	1	..	..	..	..	..	..	..	..	All mentally below par, and one a complete idiot.
10	5	5	5	..	..	5	..	1	..	..	..	..	..	..	Three of the males were idiots; two of the daughters are married and have families.
10	5	5	..	..	..	..	..	..	..	1	..	..	25	Consumption.	Survivors grown and normal.
3	2	1	..	..	..	..	..	..	..	2	..	..	..	Stillborn.	
4	2	2	..	..	..	..	..	..	..	..	..	..	..	..	All grown and without perceptible defect.
6	5	1	6	..	..	6	..	4	..	..	..	..	..	..	The ages are respectively, 13, 11, 9, 7, 5, 2 years.
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sex not reported; now 7 years old and healthy.
5	4	1	..	..	..	..	..	..	..	..	..	..	..	..	No physical defects, and mentally about like the father.
4	3	1	..	..	..	..	..	..	..	..	..	..	..	..	No physical defects; average minds.
3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	No physical defects; average minds.
4	..	4	4	..	..	..	..	..	2	2	..	2	18 6 mos.	..	All feeble in body and mind; one has rickets and bad curvature of the spine, is dwarfish.
9	4	5	5	..	..	..	..	..	4	3	1	2	20 4 2	Drowned 1. Fever 1. Erysipelas 1.	The scrofulous cases are cutaneous affections; one is an affection of the hip, destroying the joint and use of the limb; the five defective are all cripples, with a total loss or imperfect use of the lower extremities, from anchylosis of the hip, knees, or ankles, contraction of ligaments, or atrophy of muscles; one cannot walk at all; three with crutches; one very badly without.
8	4	4	2	..	..	..	..	1	1	7	4	3	2 to 19	Inflammation of brain 3. Phthisis 1. Fever 2. Injury 1.	None very bright.
1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	Normal and healthy.
4	2	2	..	..	..	..	..	..	..	1	..	..	8 hours.	Convulsions.	The living children are healthy and tolerably bright.
1	..	1	..	..	..	..	..	..	..	1	..	1	9 mos.	Convulsions.	The mother was tuberculous at birth of the child, and died of phthisis shortly afterwards.
1	..	..	..	..	..	..	..	..	..	1	..	..	7 mos.	Diseased brain.	The child was considered idiotic.
4	2	2	2	..	..	2	..	..	..	..	..	..	..	..	The eldest a perfect idiot: the youngest partially so; others normal.
1	1	..	1	..	..	1	..	..	..	..	..	..	..	..	The child is deficient in intellect and cannot speak intelligibly, though now 5 years old.

CLASS E.—

PARENTS.							
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE.	
						M.	F.
335	M. F.	Nervous. "	Both good health and habits, and above mediocrity in intellect.	Farmer.	1812	Young.	
336	M. F.	Nervous. Sanguine.	Both average health and habits, above mediocrity in intellect.	Farmer.	1807	Young.	
337	M. F.	Unknown. "	Both ordinarily good constitutions; good mental capacities.	Merchant.	—1835	Young.	
338	M. F.	Bilious. Nervous.	Both ordinarily good physical and mental endowments.	Farmer.	—1835	Young.	
339	M. F.	Bilious. Sanguine-bilious.	Both good constitutions and habits; male, patient and slow-motioned; female, active and fiery.	Farmer.	1846	Young.	
340	M. F.	Unknown. "	Both good constitutions; regular habits; average minds.	Farmer.	—1835	Young.	
341	M. F.	Sanguine. Bilious.	Both good constitution and habits.	Farmer.	—1835	Young.	
342	M. F.	Unknown. "	Both average health; good habits.	Farmer.	1822	Young.	
343	M. F.	Unknown. "	Both good health and habits; not very intelligent.	Farmer.	1790	Young.	
344	M. F.	Nervo-bilious. Unknown.	Both good health and habits. Nos. 344 & 345 are instances of two brothers marrying two sisters.	Mechanic.	1835	Young.	
345	M. F.	Nervo-sanguine. Unknown.	Both average strength of constitution; good habits.	Mechanic.	1839	Young.	
346	M. F.	Bilious. Nervous.	Both good health and habits, are of the lower class, but are as intelligent as usual for their class; both more than usually robust.	Farmer.	1837	Young.	
347	M. F.	Nervo-bilious. "	Both very robust; male, intemperate. Nos. 346 & 347 are instances of two brothers marrying their first cousins, but wives not sisters.	Laborer.	1835	Young.	
348	M. F.	Bilious. Phlegmatic.	Both good health and habits, and quite intelligent.	Merchant.	1840	Young.	
349	M. F.	Nervo-sanguine. "	Both robust constitutions, and good habits.	Merchant.	1839	Young.	
350	M. F.	Nervous. "	Average health; good habits.—Wife, rather feeble health, but attends to household duties.	Physician.	1847	Young.	
351	M. F.	Bilious. "	Both good health and habits.	Farmer.	1838	Young.	
352	M. F.	Bilio-nervous. Lymphatic.	Spare make; ordinary health; a free liver, but not an inebriate.—Wife, inclined to be fleshy; good health and habits.	..	1838	22	20
353	M. F.	Nervo-bilious. Bilio-lymphatic.	Good health and temperate habits; spare make.—Wife, good health and habits; fleshy.	Farmer.	1845	23	18
354	M. F.	Bilious. Sanguine.	Robust, vigorous health; lived well and temperate.—Wife, good constitution and habits, corpulent. Both dead.	Farmer.	1830	23	18
355	M. F.	Nervous. "	Spare form; temperate and healthy.—Wife, not healthy; spare form and small stature.	Merchant.	1830	24	18
356	M. F.	Unknown. "	Male, delicate; female, healthy. Both good habits, leading active lives.	Farmer.	1832	Young.	
357	M. F.	Unknown. "	Both good health and habits.	Farmer.	1833	Young.	
358	M. F.	Unknown. "	Both good health and habits, leading active lives.	Farmer.	1835	Young.	

***First Cousins*—Continued.**

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
6	3	3	2	..	..	2	..	..	..	1	..	..	..	Diarrhœa.	The two defective are complete idiots; others normal.
1	1	..	1	..	..	1	..	..	..	..	..	..	..	..	Is a partial idiot, but competent to do ordinary business.
6	..	..	..	..	..	..	..	..	..	6	..	..	..	Stillborn 3. Unknown 3.	
8	4	4	..	..	..	..	..	..	..	3	..	..	..	..	All average constitution and minds.
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	Sprightly and intelligent, now aged 10 years.
9	4	5	2	..	1	1	..	..	..	1	..	..	—3	..	One male has amaurosis; one female nyctalopia; all of ordinary health and minds, except the amaurotic male, who is mentally defective.
12	..	..	..	..	..	..	..	..	..	11	..	..	—6	Stillborn 3 or 4.	The survivor, a daughter, is intelligent; one of the children, who died at 6, possessed a remarkable memory and could repeat a whole sermon.
7	2	5	2	..	..	2	..	..	..	..	..	..	..	..	The two sons are idiots; the daughters normal.
2	2	..	1	..	..	1	..	..	..	..	..	..	..	..	Both living; one an idiot, the other normal.
6	3	3	..	..	..	..	..	..	..	4	..	..	8 to 20	Unknown.	Normal in intellect; all frail physically.
5	4	1	..	..	..	..	..	..	..	4	..	..	4 to 16	Unknown.	Normal.
5	3	2	5	4	..	..	..	..	..	..	..	..	..	..	The mutes are two males and two females; the other male did not walk until 10 years of age; all below average in intellect.
2	1	1	1	1	..	..	..	..	..	1	..	..	..	Convulsions.	The survivor is the mute, and is below average intellectually.
3	2	1	1	..	..	1	..	..	..	..	..	..	..	..	The youngest a partial idiot.
2	2	..	1	..	..	1	..	..	..	1	1	..	..	Marasmus.	The idiot survives.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
4	2	2	1	1	..	1	..	..	..	..	..	..	..	..	One complete idiot; all below mediocrity.
9	4	5	..	..	..	..	..	..	..	3	..	..	At birth	Hydrocephalus 2. Unknown 1.	Nearly all the survivors manifest a tendency to phthisis; none of them are mentally bright.
3	2	1	..	..	..	..	..	..	..	..	..	..	..	..	The two males are considered very dull.
4	2	2	..	..	..	..	..	..	..	3	..	..	21 8 3	Phthisis 1. Remittent fever 1. Marasmus 1.	A male, æt. 20, of bad habits and strongly disposed to phthisis, is the only representative of the family.
4	3	1	1	..	..	1	..	..	..	1	..	..	1	Dentition.	The youngest quite deficient mentally; the female intelligent.
4	2	2	..	..	..	..	..	..	..	1	..	..	18	Pneumonia.	One male was unhealthy until manhood, but then became healthy.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
6	..	..	1	..	..	..	1	..	..	..	..	..	..	..	Children healthy; one male became insane at 16, and remains so, now 18.

CLASS E.—

PARENTS.							
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	AGE AT MARRIAGE. F.
359	M. F.	Unknown. "	Both dyspeptic; good habits.	Farmer.	1832	Young.	
360	M. F.	Unknown. "	Male, healthy; female, dyspeptic. The female died after having borne eight children, when the father married a woman not related, who bore three children; two healthy, one delicate; one of the healthy children died at eighteen of acute disease.	Farmer.	1815	Young.	
361	M. F.	Unknown. "	Both healthy and good habits; the father is now laboring under mental derangement.	Physician & farmer.	1838	Young.	
362	M. F.	Sanguine. Atrabilious.	Both healthy; male, intemperate.	Farmer.	—1835	21	17
363	M. F.	Sanguine. "	Both healthy with regular habits.	Farmer.	—1835	22	20
364	M. F.	Sanguine. Phlegmatic.	Average health; habitual drinker.	Innkeeper.	—1835	22	20
365	M. F.	Choleric. Lymphatic.	Both good health and habits.	Farmer.	—1835	25	20
366	M. F.	Bilious. Nervous.	Both good health and habits.	Clergyman.	—1835	26	36
367	M. F.	Choleric. Melancholic.	Both good health and habits.	Farmer.	—1835	21	20
368	M. F.	Sanguine. Phlegmatic.	Both good health and habits.	Laborer.	—1835	20	19
369	M. F.	Unknown. "	Both good health and habits.	Farmer.	—1835	Young.	
370	M. F.	Sanguine. "	Both good size, sensible, healthy, rather corpulent, light hair, eyes, and skin; temperate.	Farmer.	1839	27	22
371	M. F.	..	Both medium size; dark hair, eyes, and skin; temperate habits. The husband healthy and vigorous, of usual intellect; wife unhealthy, coughs much in winter, but menstruates regularly.	Farmer.	1842	25	22
372	M. F.	Bilious. Sanguine.	Both healthy and intelligent; husband rather low and heavy, dark skin and black eyes, addicted to intemperance and opium eating; wife light hair and eyes, clear skin, cheerful disposition.	Millwright.	1832	25	20
373	M. F.	Unknown. "	Both good health and habits.	Farmer.	—1835	Young.	
374	M. F.	Sanguine. Nervous.	Both good health and temperate habits; tall, with light hair, eyes, and skin.	Farmer.	1839	22	21
375	M. F.	..	Both dark skin, hair, and eyes, medium size; good intellect. Husband good constitution, temperate habits; wife rather delicate, but menstruates regularly, has had goitre 18 months.	Farmer.	1846	19	19
376	M. F.	Unknown. "	Both healthy.	Farmer.	—1835	Young.	
377	M. F.	Bilious. "	Both healthy, dark skin, hair, and eyes, good size, well-formed; temperate habits.	Farmer.	1846	24	23
378	M. F.	Sanguine. Nervo-bilious.	Both rather light hair and eyes, and good skin, and temperate habits. Husband good constitution, rather low stature; wife very delicate, menstruates, but not regularly; both very sensible.	Farmer.	1853	24	23

***First Cousins*—Continued.**

CHILDREN.																
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
9	..	..	..	..	..	..	..	..	..	4	..	..	..	..	The five survivors are healthy; all females.
8	7	1	..	..	..	..	..	..	..	..	..	..	..	..	One female decidedly unhealthy: the others, with three exceptions, considered delicate.
4	..	..	2	2	..	..	..	..	..	..	..	..	..	..	
9	4	5	3	..	..	..	2	..	..	2	1	..	16 20	Injury. Suicide.	All below mediocrity.
7	2	5	1	..	..	1	..	..	..	2	1	1	17 9	Drowned. Scarlatina.	All below mediocrity.
6	3	3	3	3	..	..	..	..	..	2	..	..	..	Unknown.	
4	2	2	1	..	..	..	..	..	..	4	..	..	..	..	Had hare-lip, cleft palate, and fissured maxillary bone.
4	2	2	..	..	..	..	..	..	..	1	..	..	2	Dysentery.	Survivors have eccentricities of mind and manner so peculiar as to attract continual attention.
5	1	4	1	1	..	..	..	..	..	..	..	..	..	..	One given to inordinate lust, so that she has to be prevented from associating with opposite sex.
10	4	6	2	..	..	2	..	..	..	..	..	..	..	..	Those who have arrived at adolescency have obtuse intellects.
10	..	..	2	2	..	..	..	..	..	..	..	..	..	..	These children seem morally defective; are dishonest and untruthful.
1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	Now 15 years old, quite healthy, light hair, eyes, and skin.
6	2	4	3	3	..	..	..	..	3	3	..	1	10 18 mos.	Dysentery 1. Unknown 1. Stillborn 1.	Survivors scrofulous; intellect not reported.
8	3	5	..	..	..	..	..	..	..	1	..	..	3	Unknown.	All sensible and healthy; resembling either father or mother, except one female is cross-eyed.
8	..	..	5	3	..	..	..	1	..	..	..	..	..	..	Two have spinal affections.
1	..	1	1	..	..	..	..	..	1	..	..	..	..	..	Now 5 years old and resembles father.
1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	Now 9 years old, seems healthy.
6	..	..	6	2	..	4	..	..	..	..	..	..	..	..	All weak minded.
5	2	3	..	..	..	..	..	..	..	1	..	..	1	Scarlatina.	All appear healthy.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.

CLASS E.—

PARENTS.							
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE.	
						M.	F.
379	M. F.	Sanguine.	Good health and habits; sandy hair, clear complexion; well-formed.—Wife, dark hair, skin, and eyes; is consumptive.	Farmer.	1847	30	18
380	M. F.	Sanguine. "	Both large, well-proportioned; healthy and sensible. Husband inclined to corpulency, ruddy complexion, with "sandy or light hair;" wife dark hair and good skin.	Farmer.	1826	24	21
381	M. F.	Bilious. Sanguine.	Dark skin, hair, and eyes; healthy, with temperate habits.—Wife, fair skin, light hair, and blue eyes; healthy.	Farmer.	1837	35	30
382	M. F.	Unknown. "	Tall, good looking, dark hair, eyes, and skin; good health; intemperate.—Wife, healthy and well-formed.	..	1837	25	26
383	M. F.	Bilious. "	Both healthy, large, and well-formed, with dark hair, skin, and eyes, and good habits.	Farmer.	1827	25	24
384	M. F.	Sanguine. Bilious.	Both good constitutions; large, well-formed, with fair skins, black hair, and light eyes; habits good; both very sensible.	Farmer.	1834	28	27
385	M. F.	Bilious. Nervo-bilious.	Both dark skin, black eyes, and hair, and temperate habits; husband large, well-formed, and healthy; wife rather delicate; both good sense. In Nos. 383, 384, & 385, the husbands are brothers, and the wives sisters.	Farmer.	1829	22	20
386	M. F.	Nervo-sanguine. "	Both healthy.	Farmer.	—1835	Young.	
387	M. F.	Unknown. "	Both healthy.	Farmer.	—1835	Young.	
388	M. F.	Unknown. "	Both healthy.	Farmer.	—1835	Young.	
389	M. F.	Unknown. "	Both healthy.	Farmer.	—1835	Young.	
390	M. F.	Unknown. "	Both healthy.	Farmer.	—1835	Young.	
391	M. F.	Nervous. "	Both healthy.	Farmer.	—1835	Young.	
392	M. F.	Unknown. "	Both healthy.	Farmer.	—1835	Young.	
393	M F.	Unknown. "	Both healthy.	Farmer.	—1835	Young.	
394	M. F.	Sanguine.	Large, fleshy, ruddy complexion, sandy hair; intemperate.—Wife, very healthy; light hair and complexion.	Farmer.	1822	25	23
395	M. F.	Unknown. "	Both healthy.	Farmer.	—1835	Young.	
396	M. F.	Nervous. "	Both not robust; husband strumous.	Farmer.	—1835	Young.	
397	M. F.	..	Small, delicate, weak pulmonary system; intelligent.—Wife, tall, thin; medium health; rather weak intellect.	Paper-hanger.	1840	Young.	
398	M. F.	..	Tall, healthy, of medium weight; strong intellect; educated.—Wife, always feeble.	Profession.	1830	Young.	

First Cousins—Continued.

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Five years old, normal.
8	5	2	3	..	..	..	..	..	..	1	..	..	..	Unknown.	Three are Albinoes, well formed, but small and near-sighted.
9	8	1	1	..	..	..	..	..	1	..	..	..	..	..	One has dyspepsia; remaining seven are healthy and sensible.
6	4	2	2	..	..	1	..	..	1	1	1	..	18 mos.	Unknown.	The child that died had a singularly deformed foot, the heel projecting as far behind as the toes in front; a female, aged 6, is paralyzed, cannot articulate, and seems idiotic.
5	3	2	..	..	..	..	..	..	..	2	1	1	20 22	Consumption. "	Children not so well formed as parents, but seem healthy; the female who died had married her double cousin 18 months before, but had not been pregnant.
4	2	2	..	..	..	..	..	..	..	..	..	..	..	..	Healthy, sensible, and well formed.
7	5	2	1	..	..	..	..	..	1	..	..	..	..	..	All well formed.
9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	All physically sound, but mentally weak, especially as compared with a large circle of family relations.
8	..	..	1	..	..	1	..	..	..	..	..	..	..	..	All dwarfish and weak minded.
7	..	..	2	..	..	..	..	..	..	..	..	..	..	..	One deformed with a short arm; another, spinal disease.
6	..	..	3	..	..	..	3	..	..	..	..	..	..	..	
3	..	..	1	..	..	..	..	..	..	1	..	..	—5	Croup.	Slight ectropia, no other defects.
6	..	..	6	..	..	..	..	..	..	..	..	..	..	..	Feeble and almost perfect Albinoes.
3	..	..	2	..	..	2	..	..	..	..	..	..	..	..	
7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	No defects physically, but mentally stupid.
9	6	3	..	..	..	..	..	..	..	2	2	..	20 10	Fever. Dysentery.	Survivors healthy and sensible.
7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	No defects.
6	3	3	3	..	..	..	..	..	..	..	..	..	..	..	One with club-foot, one "enlarged abdomen," one spinal disease.
3	..	..	3	..	..	3	..	..	..	..	..	..	..	..	Children born at intervals of two years; parents and children living.
6	..	..	1	1	..	..	..	..	..	..	..	..	..	..	All healthy and intelligent; the mute is the last child, and the defect is attributed by the father to ulceration of the ear in infancy, and the use of caustic to arrest the discharge.

CLASS E.—

Number of observations.	Sex of parents in reference to.	PARENTS. TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	F.
399	M. F.	..	Both healthy and good habits; in easy circumstances of life.	Merchant.	1820	Young.	
400	M. F.	Bilious. Nervous.	Both good health and habits.	Merchant.	1829	23	23
401	M. F.	Phlegmatic. Sanguine.	Male, strumous.—Female, not healthy; subject to epileptic seizures; aborted once.	Farmer.	—1835	Young.	
402	M. F.	Bilious. Nervous.	Both rather delicate, but of good habits.	Shoemaker.	1847	22	22
403	M. F.	Lymphatic. "	Both delicate, but of temperate, regular habits.	Shoemaker.	1825	20	20
404	M. F.	Unknown. Lymphatic.	Both supposed to be of good health and habits.	..	—1830	Young.	
405	M. F.	Unknown. "	Both supposed to be of good health and habits.	..	1827	Young.	
406	M. F.	Unknown. "	Good health and habits.—Wife, sickly.	Farmer.	1844	21	..
407	M. F.	Unknown. "	Both good health and habits.	..	..	..	..
408	M. F.	Unknown. "	Both good health and habits.	..	1828	..	..
409	M. F.	Unknown. "	Both good health and habits. Male supposed to have had "white swelling" in early life, but perfectly recovered and healthy.	Farmer.	1846	21	18
410	M. F.	Unknown. "	Subject to attacks of pneumonia.—Wife, healthy.	Farmer.	1850	32	15
411	M. F.	Unknown. "	Both supposed to be of good health and habits.	..	..	Young.	
412	M. F.	Unknown. "	Both supposed to be of good health and habits.	..	..	Young.	
413	M. F.	Unknown. "	Both supposed to be of good health and habits. Male below average size.	Farmer.	—1835	30	20
414	M. F.	Nervo-lymphatic. "	Both of average health; habits of the male somewhat irregular; female had previously married a man not related, and had one healthy, normal child.	Literary pursuits.	1850	30	25
415	M. F.	Unknown. "	Both robust, and now living; probably 70 years of age.	Farmer.	1815	..	..
416	M. F.	Unknown. "	Both good health and habits.	Farmer.	1842	25	25
417	M. F.	Unknown. "	Both good health and habits.	Farmer.	1840	Young.	
418	M. F.	Sanguino-bilious. Nervo-lymphatic.	Vigorous health, and good habits.—Wife, good health; indolent and luxurious habits.	Lawyer.	—1855	25	20
419	M. F.	Nervous. Unknown.	Good health; active, good habits.—Wife, very delicate.	Lawyer.	—1835	25	20
420	M. F.	Nervous. Unknown.	Same male as in No. 419.—Wife, sister to female No. 419.	Lawyer.	1841	31	20
421	M. F.	Unknown. "	Both good health and habits; male, same as in No. 413.	Farmer.	..	30 to 40	30 to 40
422	M. F.	Unknown. "	Both good health and habits; male became epileptic at 45.	Farmer.	—1835	30	20
423	M F.	Unknown. "	Both good health and habits. Female, sister to male in No. 422.	Farmer.	—1835	30	20
424	M. F.	Unknown. "	Both good health and habits.	Farmer.	—1835	20 to 30	20 to 30
425	M. F.	Unknown. "	Both good health and habits.	Farmer.	—1835	30	20

***First Cousins*—Continued.**

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
5	2	3	4	..	..	1	..	..	..	3	1	2	25	Dysentery. Scrofula.	The idiot died; survivors dwarfish, are "mere pigmies," as was the oldest.
7	4	3	7	..	..	..	..	..	7	1	..	..	1	Convulsions.	
3	1	2	..	..	..	..	..	..	..	..	..	..	..	..	No physical or mental defect; the females bright scholars.
10	5	5	10	..	..	..	..	..	10	5	2	1	..	Phthisis 3. Scrofula 2.	From the appearance of the survivors all will soon be swept away.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
2	1	1	1	1	..	..	..	..	..	..	..	..	..	..	The male normal.
5	1	4	..	..	..	..	..	..	..	..	..	..	..	..	The living male is healthy and intelligent.
3	..	..	1	1	..	..	..	..	..	..	..	..	..	..	The mute is a female, and lost her hearing at 18 months, referred to whooping-cough.
7	3	4	3	3	..	..	..	..	..	..	..	..	..	..	The three females were mutes.
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	The child is ten years old, and healthy.
4	1	3	..	..	..	..	..	..	..	..	..	..	..	..	Normal.
3	1	2	1	1	..	..	..	..	..	..	..	..	..	..	The mute is a female.
2	2	..	2	2	..	..	..	..	..	..	..	..	..	..	
4	..	..	1	..	..	1	..	..	..	3	..	..	..	Unknown.	Survivor is a female, and inferior mentally and physically.
1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	Ducts of both parotids terminate upon the surface; now 6 years old and cannot speak intelligibly.
7	3	4	1	..	..	1	..	..	..	..	..	..	..	..	The sons exhibit most remarkable inconstancy of purpose and fickleness.
4	..	..	4	..	..	..	..	..	..	4	..	..	—5	Unknown.	
5	..	..	3	3	..	..	..	..	..	..	..	..	..	..	The mutes are two males and one female.
2	2	..	..	..	..	..	..	..	..	1	1	..	2 mos.	Mismanagement.	Both large, vigorous, fine children.
2	1	1	..	..	..	..	..	..	..	..	..	..	..	..	Both delicate until puberty; now enjoy good health.
4	1	3	1	..	..	1	..	..	..	..	..	..	..	..	The son is deficient in intellect: the daughters fine children.
5	3	2	..	..	..	..	..	..	..	1	..	1	—5	Unknown.	Nothing unusual about children.
3	..	..	1	..	..	..	..	1	..	..	..	..	..	..	The children are small but sprightly; the attack of epilepsy is attributed to a fall.
3	..	..	1	..	..	..	..	1	..	..	..	..	..	..	The child noted as "defective" is paralytic; he has a cousin epileptic whose parents are not related.
3	1	2	..	..	..	..	..	..	..	..	..	..	..	..	Nothing unusual about children.
7	2	5	..	..	..	..	..	..	..	1	1	..	..	Unknown.	The children who arrived at maturity in no respect inferior to parents.

CLASS E.—

Number of observations.	Sex of parents in relation to.	PARENTS. TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	F.
426	M. F.	Unknown. "	Both robust; habits good. Husband was a widower, and has children by his first wife.	..	1847	..	..
427	M. F.	Sanguine. Unknown.	Good health and habits.—Wife, unknown.	Merchant.	—1835	23	20
428	M. F.	Sanguine. Bilious.	Both good health and habits.	Physician.	—1835	Young.	
429	M. F.	Unknown. "	Male, healthy.—Female, of consumptive family.	Farmer.	1820	25	18
430	M. F.	Unknown. "	Both healthy; male, light eyes and complexion; female, dark eyes, skin, hair.	Trader.	1840	45	35
431	M. F.	Unknown. "	Male, healthy; light complexion, hair, and eyes.—Female, dark complexion, hair, and eyes; cancerous diathesis.	Farmer.	1816	40	30
432	M. F.	Unknown. "	Male, healthy; light complexion, hair, and eyes.—Female, dark complexion, hair, and eyes; cancerous diathesis.	Farmer.	1808	24	20
433	M. F.	Unknown. "	Both good health and habits.	Farmer.	—1835	Young.	
434	M. F.	Unknown. "	Good physical development, and good health; became a lunatic at an advanced age; was hard of hearing.—Wife, healthy until very old, then died of phthisis.	Farmer.	1790	30	20
435	M. F.	Unknown. "	Both good health and habits.	Farmer.	—1835	Young.	
436	M. F.	Unknown. "	Both good health and habits.	Farmer.	1825	Young.	
437	M. F.	Unknown. "	Both most excellent mental and physical endowment; good habits.	Physician.	1830	Young.	
438	M. F.	Unknown. "	Healthy and vigorous; at times intemperate.—Wife, supposed to be healthy; good habits.	Physician.	1852	Young.	
439	M. F.	Unknown. "	Both parents healthy and good habits.	Farmer.	1825	Young.	
440	M. F.	Sanguine. Bilious.	Both good health and habits, and good mental and physical development.—Female had borne six large, fine looking children by previous marriage to a husband not related.	Farmer.	1820	30	37
441	M. F.	Sanguine. "	Both robust, well-formed, of large size; still living, and over sixty; their ancestry were remarkable for longevity and activity to extreme old age; the relationship was by the mother's side.	Farmer.	1810	Young.	
442	M. F.	Sanguine. Phlegmatic.	Both good health and habits; six years after marriage, the female died in child-birth with her fifth child.	Farmer.	1839	33	26
443	M. F.	Unknown. "	Both good health and habits. Brother of male in No. 442, and son of female in No. 440 by her first marriage; still living, aged from 50 to 60, very corpulent.	Farmer.	1816	19	16
444	M. F.	Bilious. "	Disposed to phthisis, of which he died about 30.—Wife, healthy; affinity by mother's side.	Farmer.	—1835	Young.	
445	M. F.	Unknown. "	Predisposed to pulmonary disease, of which he died at 30.—Wife, healthy; after husband's death, married again and bore two children; healthy appearance.	Farmer.	—1835	20	18
446	M. F.	Sanguine. "	Male had suffered in early life from constitutional syphilis, and had previously married a second cousin. See No. 66, Class F.—Female, a brunette, and healthy.	Farmer.	..	45	17

First Cousins—Continued.

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
2	1	1	..	..	..	..	..	..	..	..	..	..	..	..	Both adults, healthy and vigorous.
4	2	2	1	..	..	..	..	1	..	..	..	..	..	..	One epileptic, remainder normal and healthy.
4	4	..	2	..	..	2	..	..	..	2	2	..	6 to 14	Unknown.	
4	2	2	3	..	1	2	..	1	..	2	1	1	4 8	Unknown.	One cross-eyed.
2	1	1	1	..	..	..	..	..	..	1	..	1	18	Consumption.	
8	4	4	6	..	..	1	..	..	..	4	2	2	—2	Unknown.	Five had extra fingers and toes.
5	..	..	5	..	..	1	..	..	..	..	..	..	..	..	All below mediocrity in intellect.
8	4	4	..	..	..	..	..	..	..	..	..	..	..	..	All rather inferior to parents.
5	..	..	5	..	..	2	..	..	..	.	..	..	..	..	All below mediocrity in intellect.
17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	All healthy, bright, and intelligent.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
2	..	..	..	..	..	..	..	..	..	2	..	..	—2	Unknown.	
10	..	..	4	..	..	..	..	..	..	..	..	..	..	..	Club-foot 1, dwarf 1, chorea 1, deformed 1.
2	1	1	..	..	..	..	..	..	..	..	..	..	..	..	Equal to the children of the same mother by another husband.
5	1	4	..	..	..	..	..	..	..	..	..	..	..	..	No observable defects mental or physical, though the married daughters are sterile; one has been married 20 years.
5	1	3	1	..	..	1	..	..	..	1	..	..	..	Stillborn.	The daughters resemble their mother, and promise well; the son is idiotic, 17 years of age.
12	4	8	1	..	..	1	..	..	..	8	1	7	14 —3 —16 —3	Unclosed foramen ovale 1. Dentition 3. Consumption 2. Cholera infantum 2.	These children develop early, are coarse and sensual in appearance. The married daughters bear children rapidly, but thus far all have died before maturity.
6	2	4	4	..	..	2	..	..	..	6	2	4	—20	Unknown.	Two deformed; all dead and family extinct.
5	1	4	..	..	..	..	..	..	..	5	1	4	—6 mos.	Unknown.	
1	..	..	..	..	..	..	..	..	..	1	..	..	3 days.	Convulsions.	The mother has suffered a number of abortions, and only this child was born at full period.

CLASS E.—

PARENTS.						
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M. F.
447	M. F.	Sanguine. "	Both large, robust, and intellectual; male still active, æt. 80; female died at 70; affinity on father's side.	Farmer.	1805	28 29
448	M. F.	Sanguine. Unknown.	Healthy and good habits; educated; inclined to obesity.—Wife, delicate constitution; mother and sister died of phthisis.	..	1845	45 35
449	M. F.	Sanguine. Unknown.	No report of health or habits; female of delicate frame and small stature; amiable disposition.	Farmer.	1842	35 ..
450	M. F.	Unknown. "	Both good health and habits.	Farmer.	1827	30 ..
451	M. F.	Unknown. "	Both good health and habits.	Farmer.	—1835	Young.
452	M. F.	Unknown. "	Both good health and habits.	Farmer.	—1835	Young.
453	M. F.	Unknown. "	Both good health and habits.	Farmer.	—1835	Young.
454	M. F.	Unknown. "	Both good health and habits. Male a direct lineal descendant of a distinguished orator.	Farmer.	—1830	Young.
455	M. F.	Sanguine. "	Both ordinarily good health; intellectual and highly cultivated. These parents, supposing the defects of their children were attributable to their own relationship, separated, and each having married a party not related, has one child healthy and bright.	Lawyer.	—1835	Young.
456	M. F.	Unknown. "	Good physical and mental development; educated.—Wife, strumous, bright mind, and educated.	Farmer.	1845	Young.
457	M. F.	Unknown. "	Both good health and habits.	Farmer.	—1835	Young.
458	M. F.	Unknown. "	Both healthy, but of intellects rather below average.	..	—1835	Young.
459	M. F.	Unknown. "	Both good health and habits. The male was brother to female of No. 460, Class E, and female was sister to male of No. 460.	..	1800	Young.
460	M. F.	Unknown. "	Both good health and habits; male of a high order of intellect. No hereditary predisposition to insanity known to exist in the families of Nos. 459 & 460.	..	1800	Young.
461	M. F.	Nervo-bilious. Unknown.	Both good health and habits; male was of small stature, and had lupus attacking the face at advanced life.	Farmer.	1815	25 20
462	M. F.	Nervo-sanguine. Unknown.	Both good health and habits.	Farmer.	1815	25 20
463	M. F.	Nervo-bilious. Unknown.	Both good health and habits.	Farmer.	1828	30 20

First Cousins—Continued.

CHILDREN.																
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
5	1	2	1	..	..	..	..	..	..	3	..	..	—18 22	Unknown 2. Consumption 1.	These children are coarse and sensual in appearance, and dull mentally. The son has slight spinal deformity. The daughter, dying of consumption, left two children; one, slight hemiplegia.
3	..	..	..	..	..	..	..	..	..	2	..	..	..	Marasmus 3.	Reporter does not know that any are now living.
5	4	1	2	..	..	1	..	..	..	1	1	..	—10	Fever.	The oldest, a son aged 14, is feeble and of dull intellect; a daughter is also dull in learning; the other three are average children.
5	..	..	3	..	..	1	..	1	..	..	..	..	..	..	One is deformed, having a malformed leg. No account of condition of the youngest and next older.
6	..	..	3	..	..	..	..	..	..	3	..	..	..	"Apoplexy."	The three defective were of gross habit, and below average mentally, and died young; survivors of ordinary health and minds.
5	..	..	3	3	..	..	..	..	..	..	..	..	..	..	All of average intellect.
5	..	..	..	..	..	..	..	..	..	5	..	..	..	Hemorrhage.	These children all had hemorrhagic tendency so remarkably developed, that the slightest wound would bleed indefinitely.
8	..	..	1	..	..	..	..	..	..	..	..	..	..	..	All healthy and bright, except one, who occasionally has chorea.
2	1	1	2	..	..	2	..	..	..	..	..	..	..	..	
3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	All of bright minds and healthy, except a tendency to eruptive affections.
5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	No visible defects.
3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Equal to parents in health and intellect.
6	2	4	2	..	..	..	2	..	..	1	1	..	—5	Unknown.	Four daughters married: 1st had one child, sound; 2d, six children, one insane; 3d, five children, all sound; 4th ceased to menstruate before marriage. The son married a woman, apparently healthy, without issue.
6	4	2	1	..	..	..	..	..	..	1	1	..	—5	Unknown.	Children all above average mentally, "exceedingly nervous and excitable;" one strongly disposed to melancholia.
4	1	3	2	..	..	2	..	..	..	..	..	..	..	..	One male and one female are imbecile, the female has never menstruated, æt. 23.
7	2	5	1	..	..	..	..	..	..	1	1	..	30	Rheumatic. Endocarditis.	One female had a spinal defect; the children were all of good intellectual endowment.
6	1	5	..	..	..	..	..	..	..	1	..	..	22	Typhoid fever.	Children of average intellect, except the son, who is somewhat inferior to the others.

CLASS E.—

Number of observations.	Sex of parents in reference to.	PARENTS. TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	F.
464	M. F.	Sanguine. Unknown.	Both good health and habits; male, sandy hair, blue eyes, of fine physical development and intellect, filled many offices of trust, and lived to a great age; affinity on father's side.	..	1800	Young.	
465	M. F.	Phlegmatic. Unknown.	Both ordinary health; husband rather intemperate.	Farmer.	1798	25	16
466	M. F.	Bilious. Unknown.	Both good health and habits.	Farmer.	—1835	Young.	
467	M. F.	Unknown. "	Both good health and habits.	Merchant.	1797	Young.	
468	M. F.	Nervo-bilious. Unknown.	Male, good constitution; female, delicate, and died young; both good habits.	Farmer.	1816	25	20
469	M. F.	Unknown. "	Both good health and habits.	Merchant.	1847	Young.	
470	M. F.	Unknown. "	Both good health and habits.	Merchant.	1827	Young.	
471	M. F.	Unknown. "	Both good health and habits.	Merchant.	1827	Young.	
472	M. F.	Unknown. "	Both good health and habits.	Merchant.	1817	Young.	
473	M. F.	Sanguine. "	Both good health and habits.	Farmer.	1800	23	22
474	M. F.	Sanguine-bilious. Unknown.	Good health and habits.—Wife, consumptive, and died at 30 of phthisis.	Farmer.	1835	25	20
475	M. F.	Bilious. "	Robust constitution; habits good.—Wife, delicate, inclined to strumous affections.	Farmer.	1820	Young.	
476	M. F.	Bilious-sanguine. Unknown.	Both good constitution and habits; superior intellectual endowments.	Lawyer.	1834	Young.	
477	M. F.	Choleric. Unknown.	Both good health, and active, temperate habits.	Farmer.	1824	25	22
478	M. F.	Choleric. Nervous.	Good health, intemperate, but active habits; died at 60.—Wife, usual health; still living, aged 65.	Farmer.	1812	25	20
479	M. F.	Bilious-sanguine. Unknown.	Very good health and habits.—Wife was of robust, healthy family, but died young; her own health unknown.	Farmer and preacher.	1817	25	20
480	M. F.	Phlegmatic. Unknown.	Both good health, and temperate, active habits.	Farmer.	1845	21	17
481	M. F.	Phlegmatic. Unknown.	Both good health, and temperate, active habits.	Farmer.	1853	28	31
482	M. F.	Lymphatic. Nervous.	Both good health, and temperate, active habits.	Farmer.	1835	23	18
483	M. F.	Choleric. Unknown.	Both good health, and temperate, active habits. This couple separated at the age of 35.	Farmer.	1840	25	26
484	M. F.	Choleric. Unknown.	Good health, temperate, and active habits.—Wife is delicate, supposed to have phthisis.	Farmer.	1837	25	15
485	M. F.	Phlegmatic. Unknown.	Both healthy, with temperate, active habits; male died at 75; female still living, æt. 75.	Farmer.	1802	25	20
486	M. F.	Unknown. "	Both good health and habits.	Merchant.	1837	Young.	

First Cousins—Continued.

CHILDREN.															
Number of children.	Sex. Male.	Sex. Female	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	Sex. Male.	Sex. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
10	1	9	..	..	..	..	..	..	..	6	..	..	—20	Unknown.	The son and three daughters married, and have had many children, almost all of whom have died before puberty, and the family seems likely to become extinct.
12	5	5	7	..	..	1	..	1	6	1	1	..	25	Epilepsy.	The manifestations of scrofula are strumous affections of the bones, coxalgia, &c.
12	..	..	..	..	..	..	..	..	..	12	..	..	—20	Unknown.	
5	..	..	1	..	..	1	..	..	..	1	..	..	..	Unknown.	The survivors, except the idiot, are mediocre.
5	..	5	..	..	..	..	..	..	..	3	..	..	—10	Unknown.	All of feeble vitality.
1	..	..	1	..	..	..	..	..	1	..	..	..	..	..	
3	..	..	3	..	..	..	..	..	3	..	..	..	..	..	"All peculiar and scrofulous."
4	..	..	1	..	..	1	..	..	..	..	..	..	..	..	All singular.
4	..	..	1	..	..	1	..	..	..	..	..	..	..	..	Those not idiotic are eccentric.
8	4	4	8	..	..	..	..	1	4	5	1	4	—9	Epilepsy 1. Unknown 4.	All were feeble, both mentally and physically.
4	1	3	2	..	..	1	..	..	1	..	..	..	..	..	One female has spinal curvature, from ulcerative destruction of vertebra, mentally as bright as usual.
5	..	..	3	..	3	..	..	..	..	..	..	..	..	..	Two normal.
3	2	1	..	..	..	1	..	..	..	..	..	..	..	..	Others normal.
4	1	3	1	..	..	..	..	..	..	4	1		—5	Unknown.	All had good minds; one female had chorea, until her death, so that she could not walk without support.
												3	—25	Fever.	
6	2	4	..	..	..	..	..	..	..	2	1			Killed by accident 1.	Survivors healthy, with good intellect.
												1	21	Phthisis 1.	
3	1	2	3	..	..	..	..	..	3	1	..	1	25	Phthisis.	The daughter who died had married and left a child, large of its age, but with hare-lip. The other daughter married a cousin, with whom she lived four years without issue; she has now spinal disease. The son is the subject of scrofulous ulceration of the bones.
6	3	3	..	..	..	..	..	..	..	..	..	..	..	..	All living and healthy; good minds.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	No cause known for sterility.
7	5	2	1	..	..	..	..	..	..	..	..	..	..	..	All living, of good minds and healthy, except one, a male of 14, has "cachexy." (Tabes mesenterica?)
2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	Both living; healthy and sensible.
4	..	..	1	..	..	..	..	..	..	1	..	..	..	Unknown.	One was deformed and died early; survivors healthy.
10	1	9	..	..	..	..	..	..	..	1	..	..	—5	Unknown.	The survivors are all healthy, with sound minds.
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	Eccentric and inefficient.

CLASS E.—

Number of observations.	Sex of parents in reference to.	PARENTS. TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	F.
487	M. F.	Unknown. "	Both good health and habits.	Mariner.	1849	Young.	
488	M. F.	Unknown. "	Both good health and habits.	Merchant.	1792	Young.	
489	M. F.	Unknown. "	Both good health and habits.	..	1822	Young.	
490	M. F.	Unknown. "	Both good health and habits.	Merchant.	1797	Young.	
491	M. F.	Unknown. "	Both sickly.	Mariner.	1810	Young.	
492	M. F.	Unknown. "	Both supposed to be healthy.	Merchant.	1847	Young.	
493	M. F.	Bilious. Nervous.	Both good health and habits.	Farmer.	1830	36	29
494	M. F.	Unknown. Bilious.	Well developed, physically and mentally.—Wife of slender form and scrofulous.	..	1845	25	..
495	M. F.	Unknown. "	Both supposed to be healthy.	..	1832	Young.	
496	M. F.	Unknown. "	Both supposed to be healthy.	..	1837	Young.	
497	M. F.	Unknown. "	Both supposed to be healthy.	Farmer.	1837	Young.	
498	M. F.	Nervous. Lymphatic.	Both large and well-developed physically.	..	1831	Young.	
499	M. F.	Bilio-nervous. Nervous.	Both of good constitutions, and good physical development.	..	1800	28	25
500	M. F.	Melancholic. Sanguine.	Athletic form, dark skin, eyes, and dark, harsh hair; is, in disposition, rough and angular.—Wife, slender and light form, with light auburn hair, blue eyes, and fair skin.	..	1830	25	19
501	M. F.	Sanguine. "	Both good health and habits.	Carpenter.	1849	27	21
502	M. F.	Sanguine. Phlegmatic.	Good constitution; red hair, light-blue eyes; not intellectual.—Wife, weak constitution, feeble mind, and indolent habits.	..	..	Young.	
503	M. F.	Bilious. Bilio-lymphatic.	Both healthy and good habits.	Farmer.	1841	25	23
504	M. F.	Bilious. "	Both shattered constitutions, and intemperate habits.	Laborer.	1827	Young.	
505	M. F.	Lymphatic. "	Ordinarily good health; habits good.—Wife, feeble health.	Farmer.	1852	25	20
506	M. F.	Sanguine. Bilious.	Both good health and habits.	Mason.	1839	18	23
507	M. F.	Unknown. Lymphatic.	Healthy; good habits; independent; had been previously married.—Wife, delicate health. Both intelligent and educated; wife died soon after marriage.	Farmer.	1837	..	..
508	M. F.	Unknown. "	Both good health and habits; wife was niece to husband's father.	Physician.	1845	..	..
509	M. F.	Unknown. "	Both good health and habits; male, an active intelligent man, died at 75 from injuries accidentally received.	Farmer.	1807	25	Young.
510	M. F.	Bilious-sanguine. Unknown.	Both supposed to be of good health and habits; male of fine mental development.	Saddler.	1817	Young.	

First Cousins—Continued.

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
4	..	..	1	..	..	1	..	..	..	..	..	..	..	..	Three of average brightness.
5	..	..	1	..	..	..	1	..	..	4	..	..	—5	Unknown.	Has lucid intervals.
5	2	3	5	..	..	..	1	..	..	5	..	..	..	..	Mediocre in intellect.
6	..	..	2	..	..	2	..	..	..	..	..	..	..	..	Four are of good minds.
4	..	4	1	..	..	1	..	1	..	..	..	..	..	..	The three oldest are healthy.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
3	1	2	2	..	..	..	..	..	2	1	1	..	—5	Hydrocephalus.	The daughters of fair intellect.
3	2	1	3	..	..	..	..	..	3	1	1	..	10	Scrofulous abscess and softening of the bones.	The long bones of the son who died could be bent to form a half circle. The female had intense strumous ophthalmia for three years. The youngest is covered with eczema and cannot recover.
4	1	3	4	..	..	..	..	..	4	..	..	..	..	..	All scrofulous, and disposed to phthisis.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
6	4	2	6	..	..	..	..	..	6	1	..	..	..	Unknown.	The survivors are "eccentric and scrofulous."
5	1	4	5	..	..	..	..	..	5	1	..	1	25	Phthisis.	The survivors are all scrofulous, and of intellects below average.
4	3	1	4	..	..	2	..	..	2	..	..	..	..	..	One male and the female were complete idiots; two sons of average intellect, but scrofulous.
7	4	3	4	..	..	3	..	..	..	2	1	1	15 15	Suicide. Dropsy of heart.	One daughter, not classed as idiotic, showed a great moral obliquity, was delivered of an illegitimate child at 15 without any sense of shame. Three are healthy and bright.
3	1	2	..	..	..	..	..	..	..	..	..	..	..	..	No defects.
7	..	..	7	..	..	1	..	..	..	..	..	..	..	..	All feeble minds; one a complete idiot; and one male of 14 can neither walk, talk, nor feed himself.
3	1	2	1	..	..	1	..	..	..	2	..	2	3	Hydrocephalus 2.	The idiot survives, stammers badly.
5	3	2	5	..	..	3	..	..	5	4	2	..	12 —5	Phthisis 1. Unknown 3.	Defects of offspring attributed to drunken habits of parents.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile thus far.
7	6	1	1	..	..	1	..	..	..	2	2	..	2	Burned 1. Unknown 1.	Others quite healthy.
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	Bright and healthy; still living.
3	3	..	..	..	..	..	..	..	..	..	..	..	..	..	No physical or mental defects, but extremely nervous.
10	7	3	1	..	..	1	..	..	..	..	..	..	..	..	The females were well-developed physically and mentally; two married to parties not related, one bore eleven children, three of whom died infants; of the eight survivors, one is defective mentally and physically.
4	2	2	..	..	..	..	..	..	..	..	..	..	..	..	All normal and well-developed.

CLASS E.—

PARENTS.							
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	AGE AT MARRIAGE. F.
511	M. F.	Unknown. "	Male, consumptive.—Female, good constitution.	..	—1835	Young.	
512	M. F.	Unknown. "	Both good health and habits; still living.	Clerk.	1850	Young.	
513	M. F.	Unknown. "	No report of health or habits, but may be presumed to be average; male is dead.	..	—1835	Young.	
514	M. F.	Unknown. "	Both muscular and of robust health; habits good.	Scientific pursuits.	1830	22	18
515	M. F.	Unknown. "	Both weakly; the male industrious and temperate, female subject to hysteria.	Farmer.	1827	20	20
516	M. F.	Unknown. "	Both healthy, robust, and temperate.	Farmer.	1855	28	25
517	M. F.	Sanguine. "	Ordinarily robust; of free, luxurious habits of living.—Wife, delicate, fragile, indolent, and luxurious in her tastes.	Lawyer.	1802	25	20
518	M. F.	Unknown. "	Both good health and temperate habits; male, corpulent.	Farmer.	1826	22	18
519	M. F.	Unknown. "	Both feeble health; the male has chronic disease of the liver, the female is strumous and dropsical.	Farmer.	1825	24	20
520	M. F.	Unknown. "	Robust health and temperate habits.—Wife, weakly.	Farmer.	—1835	27	30
521	M. F.	Unknown. "	Supposed to be of good health and habits.	..	—1835	Young.	
522	M. F.	Bilious. Unknown.	Robust health, good habits, corpulent.—Wife, healthy; good habits.	Physician.	1850	23	24
523	M. F.	Unknown. "	Healthy and temperate habits.—Wife, weakly.	Farmer.	1830	Young.	
524	M. F.	Unknown. "	Both good health and habits.	Farmer.	1851	23	20
525	M. F.	Unknown. "	Male, dyspeptic.—Female, healthy.	Farmer.	1825	24	25
526	M. F.	Bilious. Unknown.	Good health and habits.—Wife, supposed to have cardiac disease.	Farmer.	1851	20	20
527	M. F.	Unknown. "	Supposed to be healthy.	..	—1835	..	..
528	M. F.	Unknown. "	Supposed to be healthy.	..	1830	..	..
529	M. F.	Sanguine-bilious. Sanguine-nervous.	A large man, of admirable physique, and much bodily vigor; was some years ago temporarily insane, and still considered erratic.—Wife, small, and never enjoyed very good health after marriage.	Preacher.	1827	Young.	
530	M. F.	Unknown. "	Of good health and habits.—Wife, feeble.	..	..	Young.	
531	M. F.	Sanguine. "	Both healthy and regular habits.	Merchant.	1837	20	20
532	M. F.	Bilious. Lymphatic.	Both healthy and good habits.	Physician.	1850	36	18

First Cousins—Continued.

CHILDREN.																
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN. REMARKS, ETC.
6	3	3	6	3	..	..	..	..	6	4	2	2	20 to 26	Consumption.	The three females were deaf and dumb; the survivors have a tuberculous tendency.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
5	2	3	1	1	..	..	..	..	..	..	..	..	..	..	The mute is a female.
5	5	..	..	..	..	..	..	..	..	1	1	..	1	Croup.	The survivors are all above mediocrity; one has obtained distinction as an inventor of mechanical and agricultural implements.
15	10	5	1	..	..	..	..	..	1	..	..	..	..	..	
2	..	2	1	..	..	..	..	..	1	..	..	..	..	..	
2	2	..	2	1	..	..	1	..	2	1	1	..	16	Encephalitis.	The son that died was of diminutive person, delicate constitution, unusually large head, and precociously talented; the lunatic is still living, age 50.
4	2	2	4	..	..	..	..	..	4	..	..	..	..	..	These children are scarcely equal to usual standard; one has defective sight and strabismus.
4	1	3	4	..	..	..	..	..	..	2	1	1	..	Unknown.	The oldest daughter is deformed, one arm and leg smaller than the other. The others are of good physical development, but weak minded, pert, forward, and the butt of all their companions.
8	3	3	6	..	..	..	..	..	6	6	2	2	7 mos. to 14 mos.	Anemia.	Two of these births were premature, one stillborn, the other survived a few hours; sex of both unknown. Survivors anemic.
5	1	4	1	1	..	..	..	..	..	1	..	1	14	Pneumonia.	The mute died; several of the family connections are mutes.
2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	Normal.
12	5	7	..	..	..	..	..	..	..	..	..	..	..	..	Normal.
4	1	3	1	..	..	..	..	1	..	1	1	..	8 mos.	Epilepsy.	
9	2	7	7	2	..	..	..	..	3	2	1		2	Worms 1.	Four are myopic; two have strumous ophthalmia.
												1	14	Consumption 1.	
4	3	1	..	..	..	..	..	..	..	3	2	1	..	"Coma" 1. Stillborn 1. Hydrocephalus 1.	Survivor sprightly and healthy.
6	4	2	3	3	..	..	..	..	..	..	..	..	..	..	The mutes are two males and one female.
5	2	3	5	..	..	..	..	..	..	1	1	..	15	Tuberculosis.	All were of feeble, frail constitutions; two had defective vision; all had light hair and eyes.
4	3	1	..	..	..	..	..	..	..	1	1	..	—15	Eruptive disease.	The surviving males are respectively 29 and 24, are inferior intellectually to their father, but not strikingly defective; daughter small and delicate, but good mind.
2	..	..	1	..	..	1	..	..	..	..	..	..	..	..	The oldest is fragile in person and of feeble mind; the youngest of good health and intellect.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.

CLASS E.—

Number of observations.	Sex of parents in reference to.	PARENTS. TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	AGE AT MARRIAGE. F.
533	M. F.	Nervous. Lymphatic.	Both healthy but not vigorous; very active in their habits.	General business.	1847	36	26
534	M. F.	Lymphatic. "	Feeble and of consumptive tendency; habits regular.—Wife, not muscular, but of good health; died of dysentery.	Farmer.	1852	30	17
535	M. F.	Nervo-lymphatic. "	Both of good health, and active, regular habits.	Painter.	1838	25	19
536	M. F.	Nervo-lymphatic. Lymphatic.	Unhealthy, but of regular habits.—Wife, healthy.	Farmer.	1818	20	20
537	M. F.	Unknown. "	Healthy and good habits.—Wife, unknown,	Farmer.	1818	26	26
538	M. F.	Unknown "	Both healthy, but habits unknown.	Farmer.	1809	25	25
539	M. F.	Unknown. "	Unknown.	..	1842	22	18
540	M. F.	Sanguine nervous. Sanguine.	Both good health and habits, except the female became temporarily debilitated while pregnant with her second child.	Lawyer.	..	Young.	
541	M. F.	Unknown. "	Supposed to be of good health and habits, of a family high in social and intellectual position.—Wife, no report of habits.	..	—1835	Young.	
542	M. F.	Unknown. "	Both supposed to be of good health and habits.	Undertaker.	..	Young.	
543	M. F.	Unknown. "	Both supposed to be of good health and habits.	..	..	Young.	
544	M. F.	Unknown. "	Both supposed to be of good health and habits.	..	—1835	Young.	
545	M. F.	Unknown. "	Both supposed to be of good health and habits.	..	—1835	Young.	
546	M. F.	Unknown. "	Both supposed to be of good health and habits.	..	—1835	Young.	
547	M. F.	Unknown. "	Both of German origin; healthy and good habits.	Farmer.	—1835	Young.	
548	M. F.	Unknown. "	Both of German origin; healthy and good habits.	Farmer.	—1835	Young.	
549	M. F.	Unknown. "	Both of German origin; healthy and good habits.	..	..	Young.	
550	M. F.	Unknown. "	Both finely developed organisms, and healthy; lived to old age.	..	—1835	Young.	
551	M. F.	Unknown. "	Both finely developed organisms, and healthy.	..	—1835	Young.	
552	M. F.	Unknown. "	Both healthy and good habits, with marked family characteristics, but without known tendency to any special malady.	..	—1835	Young.	
553	M. F.	Unknown. "	Both healthy and good habits.	Farmer.	1830	Young.	
554	M. F.	Unknown. "	Both good health. The husband died some years after marriage, and the female married a man not related, by whom she bore three children, at two births, well-developed and sprightly.	..	1830	Young.	
555	M. F.	Bilious. Sanguine-nervous.	Both healthy and good habits; without personal resemblance.	Farmer.	—1835	Young.	

First Cousins—Continued.

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
3	..	3	..	..	..	..	..	..	..	..	..	..	..	..	All healthy; from 4 to 10 years of age.
1	..	..	..	..	..	..	..	..	..	1	..	..	10 mos.	Marasmus.	
5	2	3	..	..	..	..	..	..	..	1	1	..	7 mos.	Marasmus.	The survivors are anemic, but otherwise of average health.
8	6	2	1	..	..	..	..	..	1	1	..	..	30	Phthisis.	The survivors of average health; some are married and have healthy children.
4	2	2	1	..	..	..	..	..	1	..	..	..	..	..	One female has phthisis, remainder healthy.
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	Still living and healthy, mentally and physically.
5	2	3	1	..	1	..	..	..	..	1	..	1	..	Unknown.	The two youngest twins, and one blind; the sons healthy.
4	..	..	1	..	..	..	..	..	..	1	..	..	..	Smallpox.	The first child was normal, but small; the second child was malformed, having but one arm, and died young; the two last are normal.
7	..	..	2	1	1	..	..	..	..	..	..	..	..	..	Five are medium.
6	2	4	5	..	..	1	..	..	..	..	..	..	..	..	Four are deformed, one has rachitis; one only is mediocre in health and intellect.
3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Of good physical health and unusually precocious intellects.
3	..	1	2	2	..	..	..	..	..	..	..	..	..	..	The eldest is an intelligent, healthy woman; the mutes are of active temperaments, but limited capacity.
5	..	..	5	2	..	3	..	..	3	..	..	..	..	..	
8	..	..	7	1	..	7	..	..	..	..	..	..	..	..	One is possessed of moderate health and intellect.
4	2	2	3	..	..	3	..	..	..	..	..	..	..	..	These three defective were normal until adolescence, when they became imbeciles, with paralysis of entire muscular system.
6	..	..	1	..	..	1	..	..	..	1	..	..	..	Convulsions.	The idiotic daughter is ten years old and cannot walk.
2	..	..	..	..	..	..	..	..	..	2	..	..	..	Stillborn 1. Poisoned 1.	One died of morphia, given by its mother through mistake.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
7	5	2	..	..	..	..	..	..	..	..	..	..	..	..	All grown and well developed.
4	..	..	3	1	..	..	..	1	1	1	..	..	..	..	The child set down as normal died in infancy.
4	..	..	..	..	..	..	..	..	..	1	..	..	26	..	All well developed except the youngest, which is small and feeble.
5	..	..	2	..	..	2	..	..	..	..	..	..	..	..	The defective are not entirely idiotic, but are "simple."
9	..	..	4	..	..	4	..	..	..	..	..	..	..	..	Two of the idiots were insusceptible of improvement; one never learned to talk. Of the five set down as not defective three were above mediocrity, and two below that standard.

CLASS E.—

PARENTS.						
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE.
						M. F.
556	M. F.	Sanguine-bilious " "	Both good health and habits; are of large frames and intelligent.	Farmer.	—1835	Young.
557	M. F.	Unknown. "	Both good health and habits, and resemble strikingly.	..	—1835	Young.
558	M. F.	Unknown "	Both good health and habits.	Farmer.	—1835	Young.
559	M. F.	Unknown "	Both good health and habits.	Farmer.	—1835	Young.
560	M. F.	Unknown. "	Both good health and habits.	Farmer.	—1835	Young.
561	M. F.	Unknown. "	Both good health and habits. The male occupied a position of great preferment; surrounded by every circumstance calculated to promote healthy development of offspring.	..	—1835	Young.
562	M. F.	Unknown. "	Both good health and habits.	..	—1835	Young.
563	M. F.	Unknown. "	Both good health and habits; of average mental capacity.	..	..	Young.
564	M. F.	Unknown. "	Both good health and habits, and intellectual culture.		—1835	Young.
565	M. F.	Unknown. "	Both good health and habits.	..	—1835	Young.
566	M. F.	Unknown. "	Of good development, but not vigorous.—Wife, good health.	..	—1835	Young.
567	M. F.	Unknown. "	Both good health and habits.	..	—1835	Young.
568	M. F.	Unknown. "	Both good health and habits, and good mental and physical development. The male had been previously married, and has one son, by a woman not related, of fine physical frame and average intellect.	..	—1835	Young.
569	M. F.	Unknown. "	Both good health and habits, and of usual mental endowment.	..	..	Young.
570	M. F.	Unknown. "	Both good health and habits.	..	—1835	Young.
571	M. F.	Unknown. "	Both good health and habits.	..	—1835	Young.
572	M. F.	Unknown. "	Both good health and habits.	..	..	Young.
573	M. F.	Unknown. "	Both good health and habits.	..	—1835	Young.
574	M. F.	Unknown. "	Both good health and habits.	..	..	Young.
575	M. F.	Unknown. "	Both good health and habits.	..	—1835	Young.
576	M. F.	Unknown. "	Both good health and habits.	..	—1835	Young. Young.
577	M. F.	Unknown. "	Both stout and healthy, and of healthy families.	..	—1835	
578	M. F.	Unknown. "	Both very vigorous health, and good habits. The male was six feet two inches high, and very muscular, died in 1846, aged near 90; female still living, aged near 100, and retaining her faculties.	..	—1835	Young.

First Cousins—Continued.

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	All of medium health and intellect, but in size small, "rather dwarfish."
4	..	..	1	..	..	1	..	..	..	1	..	..	..	..	Of the survivors one is above mediocrity, one below, the third a complete idiot.
3	..	..	2	2	..	..	..	..	..	..	..	..	..	..	
5	..	..	1	..	..	..	..	..	..	..	..	..	..	..	One malformed, one of good talents but erratic, three fair intellect.
5	..	..	3	..	..	3	..	..	..	..	..	..	..	..	Two normal.
8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	All grew to maturity, but were not above mediocrity in intellect or physical energy; one daughter married a cousin, and is female in No. 54, Class C.
9	7	2	7	..	..	..	..	..	..	1	..	1	..	Consumption.	The surviving daughter is myopic, and has curved spine; only one son equals the father in stature; all are "queer folks."
5	1	..	..	..	..	..	..	..	..	4	..	..	—7	Unknown.	The survivor is small for his age, and a dull boy.
3	..	3	3	..	..	..	..	..	..	..	..	..	..	..	These daughters are not deformed, but seemed to have had further development arrested at ten or twelve, and are miniature women.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
4	..	4	4	4	..	..	..	..	..	..	..	..	..	..	
4	..	..	3	..	..	..	..	3	..	2	..	..	..	Convulsions.	The living daughter is diminutive in size, and of feeble intellect; the other survivor, a son, is "dull and fat."
3	..	..	..	..	..	..	..	..	..	2	..	..	..	Unknown.	The survivor is only two years old, and extremely fat.
5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Healthy and bright.
3	..	..	2	..	..	2	..	..	..	2	..	..	5 7	Unknown. "	The survivor has ordinary mind and normal development; the two idiots had club feet, and no articulate language.
3	..	..	..	..	..	..	..	..	..	2	..	..	—7	Unknown.	Survivor still young.
2	2	..	1	..	..	1	..	..	..	2	..	..	—7 16	Unknown. Fever.	The idiot stammered badly.
2	..	..	2	..	..	..	..	..	..	..	..	..	..	..	Both paraplegic.
3	..	..	..	..	..	..	..	..	..	3	..	..	—7	Unknown.	
1	..	..	..	..	..	..	..	..	..	1	..	..	—7	Unknown.	
8	..	..	2	..	..	1	..	..	..	4	..	..	16 5 —5	Marasmus 1. Unknown 1. " 2.	Two had defective vision, were almost blind; the survivors healthy.
13	..	..	4	2	..	..	..	..	2	12	..	..	15 to 30	Consumption 12.	All were mentally bright.

CLASS E.—

PARENTS.							
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE.	
						M.	F.
579	M.	Unknown.	Both good health and habits.	..	—1835	Young.	
	F.	"					
580	M.	Unknown.	Neither of good mental or physical endowment.	..	—1835	Young.	
	F.	"					
581	M.	Nervo-sanguino-bilious.	Constitution naturally good; in middle age very intemperate.—Wife, great recuperative energy of constitution; habits good.	Farmer.	1813	24	23
	F.	Nervo-bilious.					
582	M.	Nervo-bilious.	Both good health and temperate habits. The father had been previously married to a woman, not a relation, who bore two children, both inferior to the second set; the first wife was physically inferior to the second.	Farmer.	1805	36	27
	F.	Bilious.					
583	M.	Bilious.	Both good constitutions, and good habits.	Farmer.	1839	28	22
	F.	Nervo-lymphatic.					
584	M.	Nervo-sanguine.	Good constitution; habits uncertain.—Wife, good health and habits.	Clerk.	1855	27	21
	F.	Sanguine-nervous.					
585	M.	Nervo-sanguine.	Good health and habits.—Wife, feeble health; habits good.	Farmer.	1810	22	19
	F.	Nervous.					
586	M.	Unknown.	Both good health and habits. The parties differed widely in form, personal appearance, mode of thought, and manners, except that both possessed equanimity of temper; were in highly favorable circumstances of life.	Physician.	1846	Young.	
	F.	"					
587	M.	Sanguine.	Both healthy, with fair skin, sandy hair, and blue eyes; in favorable circumstances of life.	Farmer.	1821	Young.	
	F.	"					
588	M.	Sanguine.	Both healthy; the male brother to male of No. 587, the female sister to female of same number, whom they resembled; in thrifty, favorable circumstances of life.	Farmer.	..	Young.	
	F.	"					
589	M.	Sanguine.	Both healthy, and in good circumstances of life.	Farmer.	1842	Young.	
	F.	"					
590	M.	Bilio-phlegmatic.	Both good health and habits, and in good circumstances of life; both dark hair, eyes, and complexion.	Farmer.	1820	Young.	
	F.	Bilio-sanguine.					
591	M.	Sanguine-bilious.	Both good health and habits, with dark-blue eyes and dark complexion; in good circumstances of life; the female sister to female of No. 590. Two other sisters married; one a remote cousin, and was sterile; the other a man not related, and bore many children.	Farmer.	1820	Young.	
	F.	" "					
592	M.	Sanguine.	Both healthy, and in good circumstances of life.	Farmer.	—1835	Young.	
	F.	"					
593	M.	Unknown.	Both good health and habits; during the fruitful period of their union the male died of fever, the female of consumption. The male was regarded insane for some days, upon learning that his daughter was pregnant by her cousin.	Scholar.	—1835	Young.	
	F.	"					
594	M.	Unknown.	Both healthy and good habits; parents very forcibly resemble each other; are in good circumstances of life, and no reason known why their children should not equal the parents.	..	1845	Young.	
	F.	"					

First Cousins—Continued.

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
4	..	..	3	..	..	..	..	..	2	..	..	..	..	..	One is a complete albino.
3	..	..	1	..	..	1	..	..	..	2	..	..	—5 —1	Purpura hemorrhagica. Erysipelas.	The survivor is defective, both mentally and physically.
5	2	3	5	..	..	..	1	..	5	..	..	..	..	..	The three daughters are peculiarly sensitive and excitable, lacking energy and decision of character.
7	3	4	2	..	..	..	1	..	..	..	..	..	..	..	The insane child was a female; another daughter was unsteady in mind; one son was superior mentally to either of his parents.
2	1	1	2	..	1	..	..	..	2	1	1	..	2	Scrofula.	The living child is of weak mind.
1	1	..	1	..	..	..	..	..	..	1	..	..	3 mos.	Hydrocephalus.	Probably congenital, as the head was always large.
6	1	5	1	..	..	..	..	..	1	..	..	..	..	..	Of average mental and physical development.
5	1	4	..	..	..	..	..	..	..	1	..	..	4	Unknown.	The children are delicate but otherwise normal, except that the eldest is slightly cross-eyed.
11	5	6	2	1	..	..	..	..	..	5	4	1	1 23 21 19 2	Croup 1. Cholera 1. " 1. " 1. Unknown 1.	The living son is sprightly and promising: the females are merely passable; two of the females have oblong or angular pupils, and are called cat-eyed; one male had curved spine.
7	2	5	1	..	..	1	..	..	..	2	1	1	8	"Accident" 1, Croup 1.	The male with defective mind has also an impediment of speech; the females are sprightly.
3	1	2	2	..	..	..	..	..	..	..	..	..	..	..	The male and one female very hard of hearing, and of dull intellect; the others sprightly and healthy.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile. No cause known for sterility.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile. No cause known for sterility.
10	6	4	1	1	..	..	..	..	..	4	1 1	2	4 3	Convulsions. Diseased antrum. Unknown.	The mute died, aged four; the survivors are reported healthy; one male has a strangely shaped head.
5	3	2	3	..	..	3	..	..	..	1	..	1	30	Consumption.	One son and one daughter were bright; the son committed suicide, the daughter became illicitly pregnant by her first cousin, and bore a child "shockingly deformed," which lived but a few days.
3	..	3	2	..	..	2	..	..	..	..	..	..	..	..	One is very bright, the eldest and third idiots.

CLASS E.—

PARENTS.						
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE.
						M. F.
595	M. F.	Unknown. "	Both healthy and good habits; parents do not resemble; no circumstance known tending to prevent production of healthy children.	..	1842	Young.
596	M. F.	Unknown. "	No report of health or habits, except that the mother died of consumption at the age of 39.	..	1822	25 17
597	M. F.	Sanguine. Nervo-bilious.	Dark hair, blue eyes; good health and habits; wealthy.—Wife, black hair and eyes, and brunette; not robust.	Farmer.	—1835	Young.
598	M. F.	Bilious. Bilio-lymphatic.	Both good health and habits; in easy circumstances; the male has black hair and eyes, and dark skin; female dark-brown hair, fair skin, and hazel eyes.	Physician.	1840	Young.
599	M. F.	Unknown. "	Both good health and habits; good circumstances.	..	..	Young.
600	M. F.	Sanguine. Bilious.	Both healthy and long-lived; male had light hair, blue eyes, and fair skin; female, black hair and eyes, and dark skin.	Farmer.	1818	Young.

First Cousins—Continued.

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
3	1	..	1	..	..	1	..	..	..	..	..	..	..	..	The idiot is a male, and though near sixteen years old has never walked; the others are bright; sex not stated.
10	..	4	3	..	..	1	..	..	..	6	..	..	27 14	Scrofula and dropsy 1. Scarlet fever 1.	Two of the survivors have entire absence of the uterus, unless a merely rudimental body, in one case the size of a pea, in the other somewhat larger, may be regarded as such; they have never menstruated, although over 30; one is also nearly blind with amaurosis. The two others, also females, have menstruated, but one is consumptive, the other idiotic.
7	2	2	1	..	..	..	..	..	..	3	..	..	..	Stillborn 2. Unknown 1.	One living has chorea, others not healthy.
1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	Has chorea, and is of feeble vitality.
5	..	..	1	..	..	..	..	..	..	4	..	..	..	Unknown 4.	The physicians were unable to diagnose the diseases fatal to these children; the fifth still lives, but with hydrocephalus.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.

CLASS F.—

PARENTS.							
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE.	
						M.	F.
1	M. F.	Sanguine-bilious. " "	Both of good constitution and temperate habits. Female, large and well-developed; is the husband's second cousin by mother's side, and third cousin by father's.	Farmer.	1837	26	17
2	M. F.	Sanguine. Bilious.	Male, good constitution.—Female, tuberculous. Both good habits.	Farmer.	1832	30	30
3	M. F.	Phlegmatic. Bilious.	Both ordinarily good constitution and habits.	Farmer.	1833	24	19
4	M. F.	Bilious. Phlegmatic.	Both ordinarily good constitution and habits.	Farmer.	1823	24	20
5	M. F.	Bilious. Phlegmatic.	Both ordinarily good constitution and habits.	Farmer.	1841	30	17
6	M. F.	Sanguine. Bilious.	Both ordinarily good constitution and habits.	Farmer.	1837	17	15
7	M. F.	Sanguine. Bilious.	Both ordinarily good constitution and habits.	Farmer.	1822	23	17
8	M. F.	Sanguine. Bilious.	Both ordinarily good constitution and habits.	Farmer.	1824	21	16
9	M. F.	Sanguine. Bilious.	Both ordinarily good constitution and habits.	Farmer and blacksmith.	1845	21	21
10	M. F.	Sanguine. Phlegmatic.	Both ordinarily good constitution and habits.	Farmer.	1848	25	25
11	M. F.	Sanguine. Phlegmatic.	Both ordinarily good constitution and habits.	Farmer.	1852	21	22
12	M. F.	Sanguine. Phlegmatic.	Both ordinarily good constitution and habits.	Preacher.	1839	28	30
13	M. F.	Bilious. "	No report.	Farmer.	—1835	27	15
14	M. F.	Atra-bilious. "	Constitution delicate; temperate habits.	Farmer.	1852	20	..
15	M. F.	Sanguine. "	Robust and temperate.	Farmer.	1853	21	..
16	M. F.	Sanguine. "	Both robust; husband inclined to intemperance.	Farmer.	..	..	..
17	M. F.	Unknown. "	Both good health and habits.	Farmer.	1800	25	..
18	M. F.	Unknown. "	Both good health and habits.	Farmer.	1804	23	..
19	M. F.	Unknown. "	Both good health and habits.	Farmer.	1816	26	..
20	M. F.	Unknown. "	Both good health and habits.	Physician.	1840	30	..
21	M. F.	Sanguine. "	Both good health and habits.	Shoemaker.	1845	23	18
22	M. F.	Bilious. Nervous.	Both good health and habits; husband, brown hair; wife, tall, light hair and skin, blue eyes; first cousin to husband's mother.	Cabinet-maker.	1825	22	20
23	M. F.	Nervous. Phlegmatic.	Both good health and habits.	Farmer.	1830	36	14
24	M. F.	Bilious. "	Both robust; habits irregular.	Merchant.	1847	33	29
25	M. F.	Unknown. Nervous.	No report of health; intemperate habits.—No report of female.	Tinsmith.	1834	Young.	
26	M. F.	Bilious Sanguine.	Vigorous health and regular habits.—Wife had three miscarriages before the birth of a living child, none since.	Farmer.	1845	23	20
27	M. F.	Sanguine-nervous. Nervous.	No report.	..	1837	Young.	
28	M. F.	Sanguine. Bilious.	No report.	..	1820	22	18

Second Cousins.

CHILDREN.																
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
12	10	2	..	..	..	..	..	..	..	2	1	..	10 mos.	Cholera infantum. Stillborn 1.	There is a peculiar stare in the visage of the children, clearly indicating a deficiency of mental vigor, though no means are spared to educate them.
5	4	1	5	..	..	5	..	..	..	..	..	..	..	..	
2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	
7	3	4	1	..	..	1	..	..	..	1	1	..	4	Accident.	
8	6	2	1	..	..	..	..	..	..	..	..	..	..	..	"The defective child is nearly black—a mark." (Cyanosis?)
5	2	3	1	..	..	..	..	..	..	2	1	1	—3	Unknown.	One with deformed pelvis; the mother had an illegitimate son by her husband's brother, not enumerated with the five legitimate, who also had deformed pelvis.
6	3	3	3	..	..	1	..	2	..	1	1	..	1	Intestinal worms.	
4	2	2	..	..	..	..	..	..	..	..	..	..	..	..	
5	3	2	..	..	..	..	..	..	..	..	..	..	..	..	
6	4	2	1	..	..	..	..	1	..	1	..	1	1	Epilepsy.	
4	..	4	..	..	..	..	..	..	..	..	..	..	..	..	
6	5	1	1	..	..	..	..	..	..	..	..	..	..	..	The defective child was a male, one of whose testicles never descended to scrotum.
8	7	1	..	..	..	..	..	..	..	2	1	1	8 days. 6 mos.	Trismus. Cholera infantum.	The surviving children sound in body and mind, and remarkable for uniform good health.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Hitherto sterile.
2	1	1	..	..	..	..	..	..	..	..	..	..	..	..	Normal and healthy.
13	6	7	..	..	..	..	..	..	..	..	..	..	..	..	All large and healthy, mother still productive.
10	8	2	..	..	..	..	..	..	..	2	..	2	30	Consumption.	Survivors normal and healthy.
12	7	5	..	..	..	..	..	..	..	3	1	2	25 to 30	Consumption.	Survivors normal and healthy.
10	6	4	..	..	..	..	..	..	..	4	..	2	20 to 25	Consumption. Abscess.	Survivors normal and healthy.
4	3	1	..	..	..	..	..	..	..	1	..	..	..	Unknown.	Survivors normal and healthy.
5	3	2	..	..	..	..	..	..	..	..	..	..	..	..	Normal.
2	1	1	..	..	..	..	..	..	..	..	..	..	..	..	Normal.
3	2	1	1	..	..	1	..	..	..	..	..	..	..	..	One had catalepsy in early life, but finally recovered.
4	1	3	2	..	1	..	..	..	..	1	..	..	2½	..	One born with right arm amputated at wrist; others healthy.
2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	Normal.
3	..	3	..	..	..	..	..	..	..	..	..	..	..	..	All are healthy in appearance, but have frequent attacks of sickness. For the first few years the eldest had "acute affections of the head."
7	4	3	..	..	..	..	..	..	..	..	..	..	..	..	Normal.
6	2	4	..	..	..	..	..	..	..	1	..	..	3	Unknown.	Normal.

CLASS F.—

Number of observations.	Sex of parents in reference to.	PARENTS. TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	AGE AT MARRIAGE. F.
29	M. F.	Bilious. "	No report.	..	1822	25	18
30	M. F.	Bilious. "	No report.	..	1825	23	15
31	M. F.	Bilious. Sanguine-bilious.	No report.	..	1817	30	28
32	M. F.	Sanguine-bilious. Bilious.	No report.	..	1828	21	17
33	M. F.	Nervo-sanguine. Unknown.	Male, good health and habits.—Female rather weakly. Both more than ordinarily intellectual, and highly cultivated.	Teacher.	1840	Young.	
34	M. F.	Nervo-sanguine. Bilious.	Both good health and habits.	Farmer.	1832	Young.	
35	M. F.	Nervo-sanguine. Unknown.	Both good health and habits.	Physician.	1842	Young.	
36	M. F.	Lymphatic. "	Both good health and habits.	Of leisure (wealthy).	1847	Young.	
37	M. F.	" "	Both good health and habits.	Of leisure (wealthy).	1847	Young.	
38	M. F.	Sanguine-bilious. Nervo-lymphatic.	Good health and habits.—Wife, delicate constitution; habits good.	Farmer.	1846	Young.	
39	M. F.	Sanguine-nervous. Sanguine-nervous and bilious.	Both good health and habits.	Farmer.	1847	Young.	
40	M. F.	Bilio-phlegmatic. Sanguine.	Both good health and habits; husband, dark hair and eyes; wife, blue eyes, rather florid complexion. Husband was grand nephew to wife's mother.	Farmer.	1823	Young.	
41	M. F.	Unknown. "	No report.	..	..	..	..
42	M. F.	Lymphatic. "	Feeble constitution; good habits.—Wife, good constitution and habits.	Farmer.	—1836	..	..
43	M. F.	Bilious. Bilio-nervous.	Both good health and habits.	Farmer.	1843	23	20
44	M. F.	Nervous. Sanguine.	Health delicate; habits good; has strumous ophthalmia.—Wife, good health and habits; first cousin to husband's father.	Farmer.	1845	26	Young.
45	M. F.	Lymphatic. Nervo-sanguine.	Good health; intemperate.—Wife, good health and habits; first cousin to husband's father.	Mechanic.	1837	20	Young.
46	M. F.	Sanguine. Bilious.	Both good health and habits.	Farmer.	1800	45	25
47	M. F.	Sanguine-bilious. Nervo-lymphatic.	Both good health and habits.	Farmer.	1834	32	28
48	M. F.	Nervo-bilious. Unknown.	Good health, and very regular habits.—Wife, not robust; good habit.	Brickmason and farmer	1837	25	Young.
49	M. F.	Unknown. "	Both good health and habits so far as known.	Farmer and innkeeper.	1820 and 1843	Young.	
50	M. F.	Bilio-lymphatic. Sanguine.	Both good health and habits; same male as in No. 230, Class E. Lately the male has dyspepsia, and female prolapsus uteri.	Carpenter.	1842	26	20

Second Cousins—Continued.

CHILDREN.																
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
3	2	1	..	..	..	..	..	..	..	1	..	..	—5	Unknown.	Normal.
13	3	10	..	..	..	..	..	..	..	2	..	..	—5	Unknown.	Normal.
12	5	7	..	..	..	..	..	..	..	2	..	..	..	Unknown.	Normal.
7	3	4	..	..	..	..	..	..	..	1	..	..	..	Unknown.	Normal, except the great toe is double on the feet of one of the children.
4	2	2	..	..	..	..	..	..	..	3	..	..	..	Want of vitality, (lived but a few days).	The survivor is small and frail.
1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	Now 21 years of age. When a child his intellect seemed in advance of his age, now entirely behind it; has never had perfect control over his muscular system; can neither walk, talk, nor feed himself, yet he is well-formed, except so far as his efforts to struggle along have perverted his form.
5	1	4	..	..	..	..	..	..	..	2	..	..	1 to 13	Scarlatina.	All normal, except one, who is below mediocrity in intellect.
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	Normal. Nos. 3 and 4 were examples of two brothers who married two sisters upon the same day. No. 4 has been hitherto sterile.
5	4	1	3	..	..	..	..	..	..	2	2	..	2	Hydrocephalus.	
3	2	1	..	..	..	..	..	..	..	..	..	..	..	..	All living, and healthy.
9	3	3	4	..	..	..	..	2	..	3	..	..	..	Stillborn 1. Convulsions 2.	Some of the children were born with abnormities; the stillborn was a monster; no family tendency to abnormities.
3	..	..	..	..	..	..	..	..	..	1	..	..	..	Unknown.	The others healthy.
8	..	..	..	..	..	..	..	..	..	8	..	..	..	Scrofulous affections.	
6	3	3	1	..	..	..	1	..	..	..	..	..	..	..	Remainder normal.
5	5	..	1	..	..	..	..	..	1	..	..	..	..	..	The scrofulous child has enlarged tonsils, others normal and healthy.
5	2	3	..	..	..	..	..	..	..	..	..	..	..	..	No defects.
5	2	3	..	..	..	..	..	..	..	..	..	..	..	..	All healthy and intelligent.
3	3	..	2	..	..	..	..	..	2	1	1	..	1 day.	..	Survivors intelligent.
3	2	1	1	..	..	1	..	..	..	..	..	..	..	..	
7	5	2	4	..	4	..	..	..	..	1	1	..	7	Congestive chill.	The eyes of the blind are in continual dancing motion; the father married first a woman not related, who bore him 11 normal children; upon her death the female of No. 49.
2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	Healthy and fine looking, and above mediocrity in intellect.

CLASS F.—

PARENTS.						
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M. F.
51	M. Phlegmatic. F. " and bilious.	Both good constitution and habits. Husband's father was nephew to the wife's father.	Farmer.	1846	Young.	
52	M. Unknown. F. "	Both good health and habits.	Mariner.	1795	Young.	
53	M. Unknown. F. "	Male, consumptive.—Female, good health. Both good habits.	Merchant.	1835	Young.	
54	M. Unknown. F. "	Male, consumptive.—Female, good health. Both good habits.	Farmer.	1840	Young.	
55	M. Unknown. F. "	Male, never robust.—Female, good health. Both good habits.	Physician.	1826	Young.	
56	M. Leucophlegmatic. F. Nervous.	No report of health or habits.	Mariner and merchant.	1800	Young.	
57	M. Unknown. F. Nervous.	Good health and habits.—Wife, delicate constitution.	Farmer.	1844	25	25
58	M. Sanguine-bilious. F. Unknown.	Both good health and habits.	Farmer.	—1835	20 to 30	
59	M. Unknown. F. "	Good health and habits.—Wife rather delicate.	Farmer.	1845	Young.	
60	M. Unknown. F. "	Both good constitutions and habits.	Farmer.	1850	Young.	
61	M. Lymphatic. F. "	Bad constitution; habits good.—Wife, good health and habits. Of the same parentage as Nos. 326 & 327, Class E. Male was healthy until after birth of children.	Farmer.	1839	20	17
62	M. Unknown. F. "	Both good health and habits; wife died 18 years after marriage.	Manufacturer.	..	Young.	
63	M. Unknown. F. "	Both good health and habits.	Lawyer.	1831	24	24
64	M. Unknown. F. "	Both good habits; male, consumptive; female, healthy.	..	1854	Young.	
65	M. Unknown. F. "	Both good health and habits, and in easy circumstances.	Merchant.	1842	Young.	
66	M. Sanguine. F. Unknown.	Same male as in No. 446, Class E; had long suffered with constitutional syphilis; upon his supposed recovery married this female, healthy and good habits; they were divorced, and the female again married, and lived six years without issue.	Farmer.	—1835	Young.	
67	M. Choleric. F. Unknown.	Both healthy, with temperate, active habits.	Farmer.	1845	24	17
68	M. Choleric. F. Unknown.	Both healthy, with temperate, active habits.	Farmer.	1855	24	18
69	M. Melancholic. F. Unknown.	Both healthy, with temperate, active habits.	Farmer.	1834	26	17
70	M. Unknown. F. "	Male died at 30 of phthisis.—Female still living, aged 35, healthy.	Farmer.	1842	20	20
71	M. Choleric. F. Unknown.	Both healthy, with temperate, active habits.	Farmer.	1844	22	17
72	M. Choleric. F. Unknown.	Both healthy, with temperate, active habits.	Farmer.	1842	20	17
73	M. Unknown. F. "	Both healthy, with temperate, active habits.	..	1822	Young.	
74	M. Unknown. F. "	Both healthy, with temperate, active habits.	..	1847	Young.	
75	M. Unknown. F. "	Both healthy, with temperate, active habits.	Lawyer.	1851	..	..

Second Cousins—Continued.

CHILDREN.																
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	Did not talk until his sixth year, has tolerable health, but is a semi-idiot.
9	5	4	..	..	..	..	..	..	..	..	..	..	..	..	All grew up healthy and bright.
2	2	..	1	..	..	..	..	..	1	1	..	..	3	Scrofula.	Survivor not robust but bright.
3	3	..	1	..	..	..	..	..	1	1	..	..	6	Convulsions.	
8	4	4	..	..	..	..	..	..	..	3	3	..	—3	Unknown.	One female married and died of stomatitis materna after first child; remainder bright but delicate; all of light complexion.
3	2	1	..	..	..	..	..	..	..	1	..	1	—3	Unknown.	One of the males was of nervous temperament, and died of bilious fever, æt. 30; the survivor is of temperament similar to father.
4	1	..	..	..	..	..	..	..	..	3	..	..	..	Stillborn.	Sex of the stillborn not recollected; the living child, now eight years old, sprightly and well developed.
7	1	6	..	..	..	..	..	..	..	..	..	..	..	..	All living, but of only ordinary mental or physical capacities.
2	1	1	2	..	..	..	..	..	2	..	..	..	..	..	Have fair hair, light blue eyes, pale doughy skin, and precocious intellect.
2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	Well developed and sprightly.
4	2	2	4	..	..	2	..	..	..	3	1	2	2 to 3	Convulsions 3.	The survivor is neither robust nor bright, but is tolerably healthy.
6	..	..	..	..	..	..	..	..	..	4	..	..	..	..	
4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	All healthy.
1	..	..	..	..	..	..	..	..	..	1	..	..	1	Tubercular meningitis.	
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	Now healthy and bright, 12 years old, no other pregnancy.
2	..	2	..	..	..	..	..	..	..	2	..	2	9 mos. 4	Cholera infantum. Fever.	Both children gave evidence of syphilitic taint during dentition.
6	..	6	..	..	..	..	..	..	..	..	..	..	..	..	All healthy and bright.
1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	Healthy and bright.
9	5	4	1	..	..	..	..	..	1	4	2	..	4	Stillborn 1. Tubercular meningitis 2. Unknown 1.	Four are normal and healthy.
3	1	2	..	..	..	..	..	..	..	..	..	..	..	..	All healthy and bright.
5	2	3	..	..	..	..	..	..	..	..	..	..	..	..	All healthy and bright.
7	3	4	..	..	..	..	..	..	..	..	..	..	..	..	All healthy and bright.
7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	These children are healthy, but eccentric and inefficient.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
2	..	..	1	..	..	..	..	..	1	..	..	..	..	..	Both bright minds.

CLASS F.—

Number of observations.	Sex of parents in reference to.	PARENTS. TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE. M.	AGE AT MARRIAGE. F.
76	M. F.	Unknown. "	Both healthy, with temperate, active habits.	..	1837	28	22
77	M. F.	Unknown. "	No report of health and habits. The female is a deaf mute.	..	—1835	Young.	
78	M. F.	Unknown. "	Healthy and good habits; independent.—Wife, always feeble; died after birth of fifth child.	Farmer.	1830	Young.	
79	M. F.	Sanguine. "	Both healthy and good habits; affinity upon father's side.	Farmer.	1815	28	25
80	M. F.	Unknown. "	Both healthy and good habits.	..	—1835	Young.	
81	M. F.	Sanguine. "	Both healthy, and very regular habits.	Of leisure.	1841	33	30
82	M. F.	Unknown. "	Stout; healthy; temperate habits.—Wife, fleshy; hysterical.	Farmer.	1833	27	25
83	M. F.	Unknown. "	Unknown.	..	..	..	..
84	M. F.	Sanguine. Lymphatic.	Both of good health and habits.	Farmer.	1842	21	21
85	M. F.	Leucophlegmatic. Lymphatic.	Both healthy, with regular, active habits.	Merchant.	1839	32	28
86	M. F.	Unknown. "	Both of excellent health and good habits, but dissimilar in temperament and personal appearance.	Farmer.	—1835	Young.	
87	M. F.	Unknown. "	Both of general good health and habits; resemble each other in personal appearance, form, and temperament.	Farmer.	—1835	Young.	
88	M. F.	Unknown. "	Both of good health and habits, are dissimilar in appearance and temperaments.	Farmer.	—1835	Young.	
89	M. F.	Sanguine. "	Both healthy and good habits.	Farmer.	1839	42	26
90	M. F.	Lymphatic. Sanguine.	Both healthy and good habits.	Farmer.	1854	30	17
91	M. F.	Lymphatic. "	Scrofulous, dropsical, and a confirmed invalid.—Wife, healthy and active.	Farmer.	1838	23	20
92	M. F.	Lymphatic. "	Both feeble health, but active, good habits; both died of phthisis.	Farmer.	1845	21	19
93	M. F.	Nervo-lymphatic. Unknown.	Healthy, but sluggish.—Female, unknown.	Farmer.	1824	27	35
94	M. F.	Unknown. "	Healthy and good habits.—Female, unknown.	Farmer.	1809	22	26
95	M. F.	Sanguine. Lymphatic.	Strong, active, and temperate habits.—Female, healthy; corpulent.	Merchant.	1850	22	25
96	M. F.	Unknown. "	Supposed to be of good health and habits.	Farmer.	1838	26	15
97	M. F.	Unknown. "	Both supposed to have been of good health and habits.	Farmer.	1827	23	27
98	M. F.	Sanguine. Lymphatic.	Healthy, with inactive, irregular habits.—Female, no report.	Merchant.	1855	..	..
99	M. F.	Unknown. "	Healthy, with irregular habits.—Female, unknown.	Farmer.	1838	22	17
100	M. F.	Unknown. "	Both healthy; habits unknown.	..	1813	44	32
101	M. F.	Unknown. "	Healthy; no report of habits.—Wife, feeble, consumptive tendency.	..	1831	25	23

Second Cousins—Continued.

CHILDREN.															
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	All healthy and bright.
6	4	2	3	3	..	..	..	..	..	..	..	..	..	..	Two uncles and several other relatives deaf mutes; two males and one female are mutes.
5	..	..	..	..	..	..	..	..	..	2	..	..	3 mos. —5	Marasmus 1. Convulsions 1.	The survivors were inclined to pulmonary affections in early life, but are now healthy and bright.
4	1	3	1	..	..	..	..	..	..	..	..	..	..	..	One daughter has one hazel and one blue eye, and one is sterile after many years of marriage; otherwise they are fine looking and of average mental endowments.
9	6	3	1	1	..	..	..	..	..	..	..	..	..	..	The deaf mute is a female, and is supposed by her parents to have lost her hearing from scarlatina at three months.
6	3	3	1	..	..	1	..	1	..	1	..	1	3	Tracheitis.	The idiot and epileptic died; the survivors are healthy and well-formed except being cross-eyed.
9	3	6	2	..	..	..	..	..	2	1	..	1	..	Stillborn.	No defects.
3	3	..	1	1	..	..	..	..	..	..	..	..	..	..	..
4	2	2	2	2	..	..	..	..	..	1	..	1	10	Scarlatina.	The two females are semi-mutes; the two males healthy.
3	..	3	..	..	..	..	..	..	..	..	..	..	..	..	All normal and sprightly.
8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Two have arrived at maturity, all healthy and sprightly.
4	..	..	4	1	..	3	..	..	..	..	..	..	..	..	The eldest a mute, the remainder semi-idiotic.
4	..	..	1	..	..	1	..	..	..	..	..	..	..	..	The third child is frail in body and almost an idiot.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
2	2	..	..	..	..	..	..	..	..	.	..	..	..	..	Both healthy.
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	Living and healthy, aged seventeen years.
1	1	..	1	..	..	..	..	..	1	..	..	..	..	..	Eleven years old, and evidently consumptive.
3	1	2	..	..	..	..	..	..	..	1	1	..	7	Brain fever.	Two daughters healthy and married; one of them is female in No. 49, Class C.
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	Living and healthy, and is male in case No. 50, Class C.
3	1	2	..	..	..	..	..	..	..	..	..	..	..	..	Normal.
10	6	4	1	..	..	..	..	..	1	1	..	..	15	Tuberculosis.	The scrofulous child is also deformed, the others healthy.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
1	1	..	..	..	..	..	..	..	..	1	1	..	17	Scarlatina.	
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	Living and healthy, aged three or four years.
1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	Lived but a few hours; sex unknown.
7	4	3	2	..	..	..	..	..	2	1	..	1	16	Dysentery.	Survivors healthy except the scrofulous son, aged 15, who has spinal disease, and a son, aged 24, in the last stage of consumption.

CLASS F.—

PARENTS.							
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE.	
						M.	F.
102	M.	Unknown.	Both healthy; habits unknown.	..	1830	24	25
	F.	"					
103	M.	Nervous.	Both healthy; indolent habits.	Farmer.	1826	23	23
	F.	Sanguine.					
104	M.	Unknown.	Both healthy; habits unknown.	Farmer.	1827	22	22
	F.	"					
105	M.	Unknown.	Both healthy; habits unknown.	..	1854	Young.	
	F.	"					
106	M.	Unknown.	Both healthy; habits unknown.	..	1833	Young.	
	F.	"					
107	M.	Unknown.	No report.	..	—1835	Young.	
	F.	"					
108	M.	Unknown.	Both good health and habits. Male's mother bore eight children; female's mother nine.	Merchant.	—1835	Young.	
	F.	"					
109	M.	Unknown.	Both good health and habits.	..	—1835	Young.	
	F.	"					
110	M.	Unknown.	Both good health and habits.	..	—1835	Young.	
	F.	"					
111	M.	Unknown.	Both good health and habits.	..	—1835	Young.	
	F.	"					
112	M.	Sanguine.	Both good health and habits; well-formed, and of healthy stock.	Confectioner.	1830	30	25
	F.	"					
113	M.	Sanguineo-bilious.	Both good health and habits.	Manufacturer.	..	30	25
	F.	Sanguine.					
114	M.	Bilious.	Both healthy, with black hair and eyes; in good circumstances of life.	Farmer.	1839	Young.	
	F.	"					
115	M.	Bilious.	Both healthy; the male has dark hair and eyes; the female light hair, fair complexion, and blue eyes; in good circumstances of life. The male was brother to male in No. 114; and female was sister to female of No. 114.	Farmer.	1840	Young.	
	F.	Sanguine.					
116	M.	Sanguine-nervous.	Good health and habits.—Wife, rather feeble; good habits.	Farmer.	1845	28	25
	F.	Nervous.					
117	M.	Unknown.	Both good health and habits; of prolific families.	Farmer.	1847	Young.	
	F.	"					
118	M.	Bilious-sanguine.	Black hair, eyes, and dark complexion.—Wife, blue eyes, light hair and complexion. Both of healthy parentage.	Farmer.	1800	Young.	
	F.	Nervo-sanguine.					
119	M.	Bilious.	Both dark hair, complexion, and eyes; male, healthy and corpulent; female, spare, not robust, died of phthisis four years after marriage.	Editor.	1850	36	26
	F.	Nervo-bilious.					
120	M.	Bilious.	Both healthy, and in easy circumstances of life.	Farmer.	..	Young.	
	F.	Sanguine.					

Second Cousins—Continued.

CHILDREN.																
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
6	..	6	..	..	..	..	..	..	..	..	..	..	..	..	All living and healthy, aged from 26 to 13.
5	2	3	..	..	..	..	..	..	..	1	1	..	9	Drowning.	Normal.
3	2	1	..	..	..	..	..	..	..	..	..	..	..	..	All healthy.
2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	All healthy.
9	3	6	..	..	..	..	..	..	..	1	..	..	..	Smallpox.	Survivors healthy.
6	3	3	1	1	..	..	..	..	..	1	..	1	17	Consumption.	The mute lost her hearing at 18 months from measles, and died at 17; survivors healthy.
3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Without deformity, but all rather delicate.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
3	..	..	1	..	..	..	..	..	..	1	..	..	..	Unknown 1. Drowned 1.	The survivor is healthy and normal; the one drowned had heart disease.
5	2	3	..	..	..	..	..	..	..	2	..	2	..	Consumption 1. Hydrocephalus 1.	The survivors are all married, one is male in No. 56, Class C.
2	1	1	1	..	..	1	..	..	..	1	1	..	4	Scarlatina.	The survivor is feeble in body and mind.
3	1	2	2	..	..	..	..	..	2	..	..	..	..	..	These children are but slightly scrofulous, and are otherwise bright and active.
8	4	4	1	..	..	..	..	..	..	5	4	1	—1 mo. 2	Convulsions. "	One of the deceased was badly deformed; one of the survivors has chronic enlargement of the tonsils, and slight deafness.
5	4	1	..	..	..	..	..	..	..	1	1	..	..	"Sore-throat."	The four survivors healthy and sprightly.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
12	6	6	2	..	..	..	..	..	..	..	..	..	..	..	Two were deformed, a son with deformed arm, a daughter with curved spine; none entirely equal to parents, who were remarkably endowed, both physically and mentally.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Sterile.
8	6	2	2	..	..	2	..	..	..	1	..	..	—5	Unknown.	Of the two defective, one has curved spine, and both hear badly; the others are said to be sprightly.

CLASS G.—

PARENTS.							
Number of observations.	Sex of parents in reference to.	TEMPERAMENT.	HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.	AGE AT MARRIAGE.	
						M.	F.
1	M. F.	Lymphatic. Bilious.	Both good health and habits.	Farmer.	1842	21	17
2	M. F.	Lymphatic. Nervo-sanguine.	Both good health; male, habits doubtful; female, industrious habits.	Gambler.	1833	21	18
3	M. F.	Nervous. "	Both delicate health; regular habits.	Farmer.	1830	22	..
4	M. F.	Nervous. Bilious.	Good constitution.—Wife, scrofulous. Both active and regular habits.	House-joiner.	1824	26	23
5	M. F.	Unknown. "	Both good health and habits. Male is brother to male No. 409, Class E, and to female No. 405, Class E.	Farmer.	1847	Young.	
6	M. F.	Unknown. "	Both good health and habits. Male is brother to male No. 409, Class E, and female, No. 405, Class E. Both still in prime of life.	Farmer.	1846	Young.	
7	M. F.	Sanguine. Bilious.	Good health and habits; brother to male No. 446, Class E.—Female, not healthy; died of pulmonary disease at 33. Fourth cousins.	..	—1835	23	16
8	M. F.	Nervo-sanguine. Unknown.	Good health and habits.—Wife, scrofulous, has permanently thickened Schneiderian membrane. Fifth cousins.	Physician & farmer.	1837	32	20
9	M. F.	Bilious. Nervous.	Very tall, stooping, and subject to bronchitic coughs.—Female, no report of health.	Farmer.	1816	25	22
10	M. F.	Unknown. "	Both healthy, robust, and temperate.	Farmer.	1849	18	19
11	M. F.	Lymphatic. Sanguine.	Male, scrofulous.—Female, healthy. Both regular habits.	Of leisure.	1812	27	20
12	M. F.	Sanguine. Unknown.	Healthy, and good habits.—Wife, unknown.	Farmer.	1830	30	30
13	M. F.	Bilious. Unknown.	Both healthy, and in good circumstances of life.	Farmer.	—1835	Young.	

Third Cousins.

CHILDREN.																
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	Age at death.	CAUSE OF DEATH.	CONDITION OF CHILDREN, REMARKS, ETC.
8	4	4	..	..	..	..	..	..	..	2	1	1	—5	Cholera infantum.	No defects, either physical or mental.
8	2	6	..	..	..	..	..	..	..	1	1	..	6	Inflammation of brain from wound.	No defects, either physical or mental.
5	3	2	2	..	..	1	..	..	2	..	..	..	..	..	
7	3	4	3	3	..	..	..	..	..	..	..	..	..	..	No other defects; the mutes have received a good education, and both they and the remaining children are bright, active, and healthy.
4	3	1	..	..	..	..	..	..	..	..	..	..	..	..	No defects.
4	2	2	..	..	..	..	..	..	..	1	..	1	—5	Unknown.	No defects.
3	2	1	2	..	..	..	..	2	..	..	..	..	..	..	The males were subject to convulsions during dentition, one is deaf and stooped; daughter normal.
7	5	2	..	..	..	..	..	..	..	1	..	1	8	Hydrocephalus.	All are subject to otorrhœa; five have altered voices from permanent thickening of Schneiderian membrane.
3	2	1	..	..	..	..	..	..	..	..	..	..	..	..	Nothing unusual about offspring.
2	1	1	2	..	..	..	..	..	2	..	..	..	..	..	
7	3	4	6	..	..	..	1	..	6	3	3	..	18 mos. 7 17	Phthisis.	The insane girl became so at 25, and continues so.
1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	Lame from coxalgia in infancy.
12	3	9	2	..	..	1	..	..	..	1	..	..	..	Unknown.	Two females are helpless from rachitis, one is idiotic, another female is eccentric, the others bright.

CLASS H.—*Cases irregularly*

Number of observations.	PARENTS. HEALTH, HABITS, ETC.	OCCUPATION.	WHEN MARRIED.
1	No report of health or habits.	Farmer.	..
2	Do. do. do.	Farmer.	1827
3	Do. do. do.	Farmer.	1820
4	Do. do. do.	..	1830
5	Do. do. do.	..	1830
6	Do. do. do.	Mariner.	1828
7	Do. do. do.	Merchant.	1827
8	Do. do. do.	..	1822
9	Do. do. do.	Merchant.	1797
10	Do. do. do.	..	1807
11	Do. do. do.	Mariner.	1827
12	Do. do. do.	Merchant.	1807
13	Do. do. do.	..	1837
14	Do. do. do.	..	1849
15	Do. do. do.	..	1832
16	Do. do. do.	Farmer.	1827
17	Do. do. do.	Merchant.	1807
18	Do. do. do.	..	..
19	Do. do. do.	..	..
20	Do. do. do.	Baker.	1807
21	Do. do. do.	Mariner.	1803
22	Do. do. do.	..	1837
23	Do. do. do.	..	1847
24	Do. do. do.	..	1808
25 to 30	Six couples of first cousins, in which the parties were all mutually related; healthy and robust, but of intemperate habits; are still young, and females of some of the unions continue to produce.	Farmers.	

TABLE OF

CLASSES.	Number of observations in each class.	Number of children.	SEX. Males.	SEX. Females.	Number defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Deformed.
A	10	31	15	10	29	..	..	19	..	1	5	11
B	12	53	17	14	40	1	3	3	1	1	12	14
C	56	234	109	77	126	10	12	30	3	4	44	9
D	27	154	47	51	42	2	2	4	6	2	10	2
E	580	2778	1040	995	793	117	63	231	24	44	189	53
F	112	513	234	211	67	9	5	17	1	6	15	9
G	12	59	30	29	16	3	..	1	1	2	10	..
H	24	120	17	24	21	3	..	3	2	..	15	..
Total	833	3942	1509	1411	1134	145	85	308	38	60	300	98

reported, all First Cousins.

CHILDREN.											
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	CONDITION OF CHILDREN, REMARKS, ETC.
3	..	..	3	3	..	..	..	..	..	..	Whole number of children not stated.
2	..	..	..	..	..	..	..	..	..	..	Healthy.
4	..	..	..	..	..	..	..	..	..	..	Healthy.
11	..	..	1	..	..	..	..	..	1	..	Remainder healthy.
9	..	..	..	..	..	..	..	..	..	8	Survivor feeble.
6	..	..	6	..	..	..	..	..	6		
3	..	..	3	..	..	..	..	..	3		
5	2	3	5	..	..	..	1	..	5	..	Intellects mediocre.
5	..	..	..	..	..	..	..	..	..	..	"Very good health, but odd and eccentric."
7	..	..	3	..	..	3					
1	..	..	..	..	..	..	..	..	..	..	Bright and healthy.
6	2	4	..	..	..	..	..	..	..	..	All healthy.
10	..	..	..	..	..	..	..	..	..	4	
5	..	..	..	..	..	..	..	..	..	..	Healthy.
4	..	..	..	..	..	..	..	..	..	..	Healthy.
3	..	..	1	..	..	1					
6	..	..	..	..	..	..	..	..	..	..	Healthy.
2	..	2	2	2	..	..	..	..	..	..	Two beautiful daughters are deaf mutes.
3	..	..	3	..	..	3					
7	..	..	..	..	..	..	..	..	..	..	All healthy.
2	..	..	..	..	..	..	..	..	..	..	"Not efficient."
7	..	..	..	..	..	..	..	..	..	..	Regarded as "peculiar."
..	..	..	..	..	..	..	..	..	..	..	Sterile.
2	1	1	2	..	..	..	..	..	2		
30	13	17	..	..	..	..	..	..	..	..	Number dead unknown; survivors are large and healthy, and all of them defective in moral principle.

AGGREGATES.

Died young.	Sterile.	Average number of births to each marriage.	Average number of births to marriages before 1835.	Number of males to 100 females.	PER CENT. Defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Deformed.	Died young.
..	..	4.5	4.44	150	93.5	..	..	61.2	..	03.2	16.1	35.4	..
23	3	4.41	7.5	121	75.4	01.9	05.6	05.6	01.9	01.9	20.7	26.4	43.3
63	4	4.17	5.6	141	53.8	04.2	05.1	12.8	01.2	01.7	18.8	03.8	26.9
55	..	5.7	6.2	92	27.2	01.2	01.2	02.5	03.8	01.2	06.3	01.2	35.
637	40	4.8	5.96	104½	24.9	04.2	02 2	08.3	..	01.6	06.2	01.9	22.5
85	5	4.58	5.4	$110\frac{9}{10}$	13.	01.7	..	03.3	..	01.1	02.9	01.7	16.5
8	..	4.91	5.85	$103\frac{4}{10}$	27.	05.	..	01.7	01.7	03.4	16.9	..	13 5
12	1	5.	..	..	17.5	02.5	..	02.5	01.6	..	12.5	..	10.
883	53	4.46	..	124½	28.7	03.6	02.1	07.	..	01.5	07.6	02.4	22.4

TABLE I.—*Comparative Results of Marriages between parties not pre-*

PARENTS.			
NUMBER OF OBSERVATIONS.	HEALTH, HABITS, ETC.	RESIDENCE.	OCCUPATION.
1	Both healthy. Male was brother to male of No. 592, Class E; other brothers, whose cases are not reported, married without the circle of relationship, having perfect children.	Kentucky.	..
1	Both healthy; male bilious, female sanguine, temperament; in easy circumstances of life. Male was brother to male of No. 13, Class G.	Kentucky.	Farmer.
1	Male, brother to females of Nos. 587 and 588, Class E, has married three times; one wife delicate, the others healthy; of good health, and wealthy; sanguine temperament.	Kentucky.	Farmer.
1	Both good health and habits; male had dark hair, eyes, and skin, bilious temperament; female, blue eyes, fair skin and hair, sanguineo-lymphatic. Male was brother to female of No. 600, Class E.	Kentucky.	Farmer.
10	These couples were taken from ordinary circles of life in and around a small interior village, probably in many instances comfortable farmers.	Tennessee.	..
10	Taken from ordinary circles of life in and around a flourishing city.	Indiana.	..
15	Taken from ordinary circles of life in and around a small town, probably farmers in a majority of instances.	Missouri.	..
10	Taken from ordinary circles of life in and around a village.	Ohio.	..
15	Taken from ordinary circles of life in a flourishing city.	Wisconsin.	..
20	All of these parents are farmers, with two or three exceptions.	New Jersey.	Farmers.
10	All from a country residence, probably farmers.	New York.	Farmers.
10	Taken from ordinary circles of life in and around a village.	Vermont.	..
10	Taken from ordinary circles of life in and around a village.	Vermont.	..
1	Both good health; male had light hair and complexion, blue eyes, at times intemperate, was brother to male of No. 600, Class E; female, red hair, blue eyes, fair skin, good habits.	Kentucky.	Farmers.
10	Taken from ordinary circles of life in and around a small interior village, and probably farmers in a majority of instances; all good livers.	Kentucky.	..
Total 125			

NOTE.—Thirty-one marriages of parties not known to be related or descendants of relations, occurring in and around a small village in Kentucky, produced two hundred and seven children, ninety-eight males, one hundred and nine females. The number dying before maturity not stated. Two of these unions were followed each by thirteen children—the greatest number born to any one marriage; three

viously related or known to be the immediate descendants of Relations.

CHILDREN.													
Number of children.	SEX. Male.	SEX. Female.	No. defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	SEX. Male.	SEX. Female.	CONDITION OF CHILDREN, REMARKS, ETC.
6	5	1	..	..	..	..	..	..	..	..	..	..	All healthy and sprightly.
8	3	5	1	..	..	..	..	..	..	2	1	1	The female who died had curved spine, remainder normal and healthy.
12	..	..	..	..	..	..	..	..	..	..	..	..	Sex not known, all good looking, intelligent, and healthy.
8	4	4	..	..	..	..	..	..	..	1	1	..	All healthy, intelligent, and well-formed.
83	38	45	..	..	..	..	..	..	..	23	12	11	All were well-formed; the survivors are healthy, with the exception of one, who is predisposed to consumption.
71	32	39	..	..	..	..	..	..	..	8	3	5	Not an instance of physical deformity or mental imbecility among them.
111	55	56	..	..	..	..	..	..	..	20	10	10	
68	40	28	..	..	..	..	..	..	..	7	..	..	Those who survive are, without exception, well-formed and usually well-endowed.
74	42	32	..	..	..	..	..	..	..	15	8	7	No physical or mental abnormities among survivors.
143	86	57	12	3	..	5	1	..	..	16	..	..	Three of the defective have difficult articulation; sex of those who died not reported.
68	37	31	1	..	*1	..	..	*1	*1	6	3	3	Survivors well-formed, and of ordinary health.
59	36	22	..	..	..	..	..	..	..	11	..	..	One survivor had chorea; his father, a drunkard; remainder normal and healthy.
55	26	29	3	..	..	..	..	2	..	14	..	..	One is deformed from rachitis; some of the survivors rather dull, but none classed as idiots.
6	2	4	..	..	..	..	..	..	..	..	..	..	All normal and healthy, with bright minds.
65	38	27	1	..	..	1	..	..	..	11	4	7	One became insane; none deformed; one idiotic, referred to early disease. All arrived at puberty, but since two died at puberty.
837	444	380	18	3	1	6	1	3	1	134	42	44	

produced three each, the smallest number resulting from any fruitful union; four were sterile. None of the children were reported to have been born with any defect. All these were instances of first marriage, and the parties lived together through the child-bearing period.

TABLE II.—*Comparative Results from*

CLASSES.	Number of observations.	Number of children.	Number defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	SEX.	
								Male.	Female.
A	3	3	3	..	..	3	..	1	2
B	1	12	2	..	..	2	..	1	1
E	47	321	84	32	16	33	5	29	36
F	28	150	43	13	10	15	7	21	16
G	4	35	5	2	2	1	1	..	..
H	72	500	107	36	21	39	12	54	36
Total	155	1021	244	83	49	93	25	106	91
100 families	100	708	148	52	17	70	9	..	..
100 families	100	667	119	40	6	67	8	60	55
Total	200	1375	267	92	23	137	17	60	55
125 families not related	125	837	18	3	1	6	1	444	380

CLIMATIC

CLIMATIC DIVISIONS.	CLASSES.	Number of observations.	Number of children.	SEX.		Number defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.
				Male.	Female.							
SOUTH. 32d to 36th parallel.	C	10	49	27	22	33	5	4	11	2	..	29
	E	64	353	146	159	93	15	20	41	3	7	15
	F	18	87	45	39	16	..	..	7	..	3	2
MIDDLE. 36th to 40th parallel.	C	26	113	50	39	44	1	3	7	..	3	14
	E	236	1217	387	406	349	35	31	88	7	14	98
	F	50	233	90	111	25	3	4	5	1	3	8
NORTH. 40th to 44th parallel.	C	20	72	32	16	49	4	5	12	1	1	1
	F	280	1208	507	430	351	67	7	102	14	23	80
	E	44	193	99	61	26	6	1	5	..	..	5

the Ohio Report and other Sources.

Died young.	Average births to marriage.	PER CENT.					Defects congenital.	Defects not congenital.	Unknown.	Number males to 100 females.	PER CENT.
		Defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.					Died young.
..	..	100.	..	..	100.	..	3	..	..	..	..
..	12.	16.6	..	..	16.6	..	2	..	..	..	..
..	6.8	26.1	09.9	04.9	10.2	..	48	18	18	80½	..
..	5.3	23.6	08.6	06.6	10.	..	19	9	15	131	..
..	8.2	14.2	05.7	05.7	02.8	02.8	..	..	..	..	..
..	6.9	21.4	07.2	04.2	07.8	02.4	81	10	16	150	..
..	6.5	23.9	08.1	04.8	09.1	02.4	153	37	49	116	..
..	7.08	20.9	07.3	02.4	09.8	01.2	148	..	..	..	..
..	6.67	16.8	06.	..	10.	01.2	119	..	..	109	..
..	6.8	19.4	06.6	03.2	09.9	01.2	267	..	..	109	..
134	6.69	02.13	003.4	001.14	007.1	001.14	12	3	3	116.8	16.

DIVISIONS.

Died young.	Sterile.	Average births to marriage.	Number males to 100 females.	PER CENT.								
				Defective.	Deaf and dumb.	Blind.	Idiotic.	Insane.	Epileptic.	Scrofulous.	Died young.	Sterile.
20	1	4.9	121	67.3	10.	.08	22.4	.04	..	59.	40.8	10.
127	1	5.54	91	26.	04.	05.6	11.5	01.9	.04	04.2	35.8	01.5
12	2	4.6+	115	18.4	..	..	08.	..	..	..	13.7	11.1
21	..	4.3	128	39.	..	02.6	06.	..	02.6	12.3	18.5	..
236	8	5.13	99	27.	02.8	02.5	07.2	..	01.+	08.	18.5	03.3
33	4	4.66	81	10.7	01.2	01.7	02.1	..	01.2	03.4	14.1	06.
21	..	3.6	200	66.6	06.5	06.9	16.6	01.3	01.3	01.3	29.	..
234	28	4.31	124	29.	05.5	..	08.4	01.	01.8	06.6	23.5	10.
38	1	4.38	162	13.9	03.1	..	02.5	..	..	02.5	19.7	02.

REPORT

ON THE

FUNCTIONS OF THE CEREBELLUM.

BY

E. ANDREWS, M.D.,
CHICAGO, ILL.

REPORT ON THE FUNCTIONS OF THE CEREBELLUM.

In preparing this report, the writer has confined his attention to that class of evidences which is to be found in the field of comparative anatomy, reserving the pathological and experimental proofs until another opportunity.

The cerebellum is a complex organ, and probably contains the nervous centres of several functions whose nature and limits are not yet very well defined. If it be viewed from above, it will be seen to present three lobes, one median lobe, or vermiform process, and two lateral lobes, Fig. 1. This division of the upper surface into three lobes is traceable throughout the Mammalia, the Aves, and the Reptilia, as I will show hereafter, though the existence of the division in the latter class has been generally denied. The three lobes are sometimes simple, but oftener divided into a number of lobules and the lobules again into laminæ. Upon the inferior surface the cerebellum presents the same number of divisions as upon the superior, but with a different relative position. Beneath the median lobe is the cavity called the fourth ventricle, on either side of the ventricle are the peduncles. In the mammalia at least the peduncles are six in number, two anterior, two middle, and two posterior, all, however, more or less adherent at their edges, so that there is no space between those of the same side. The anterior peduncles seem to belong especially to the median lobe. According to Serres, they vary in size in direct ratio with the bulk of that lobe. They run forward and connect with the rest of the cerebro-spinal axis beneath the tubercula quadrigemina. They are known in human anatomy as the *processus e cerebello ad testes.* The middle peduncles arise in the lateral lobes apparently, and running under and through the medulla oblongata form the prominence called the *pons Varolii.* They meet in the *pons* and constitute the commissure of the lateral lobes.

The posterior peduncles of the cerebellum also appear to belong to the lateral lobes, and running backwards they become continuous with the restiform bodies of the medulla. It is important to notice here, that the median lobe has its own pair of peduncles, its own commissure (valve of Vieussens), and its own attachment to the cerebro-spinal axis *in front*, while the lateral lobes have their own pair of peduncles, their own commissure, and their own attachment to the cerebro-spinal axis at a point further backward, showing apparently that though in mammalia the lateral lobes are located on each side of the median, *yet their archetypal position is posterior to it.* We shall see in the reptiles the cerebellum actually analyzed by nature, and the lateral lobes existing as separate organs, though not hitherto recognized as such by comparative anatomists.

The muscular system of mammals and birds, is the part upon which the cerebellum obviously exerts most of its influence, whatever that influence be. The muscular system of these animals is mostly collected into two groups or masses, viz., the group concerned in the motions of the anterior extremities, and the group which acts upon the posterior extremities. Each of these groups receives separate innervation, and there is an enlargement of the spinal cord in the regions where the nerves to each are given off. With each group are probably to be classed the muscles of the contiguous portions of the trunk. Since, therefore, the two groups are thus separate, and connect with separate expansions in the spinal axis, it is not improbable at all, that the encephalic connection may also lead to separate centres, and if the cerebellum be an organ at all connected with motor functions, as it certainly is, there would be a certain amount of *a priori* probability, that the lateral lobes, which are properly the posterior, would preside over the muscles of the posterior group, and the median lobe in like manner exert their influence upon those of the anterior group.

As supporting this theory, I present the following propositions:—

1. *In the warm blooded animals, the median lobe, or vermiform process of the cerebellum varies in size directly as the bulk and power of the anterior group of muscles.*

2. *The lateral lobes vary in like manner, as the power of the posterior group of muscles; subject, however, to certain variations hereafter to be mentioned.*

The figures which I offer in illustration of these propositions are from my own dissections, except where credit is given, and are carefully corrected by measurements upon the specimen, so that their accuracy may be depended upon.

Fig. 1 represents on a reduced scale the human encephalon, one posterior cerebral lobe being removed to show the cerebellum. It will be observed that the median lobe is much the smallest, being crowded between and overtopped by the bulkier lateral lobes. Corresponding to this difference, is the feebleness and small size of the muscles in the region of the superior extremities, as compared

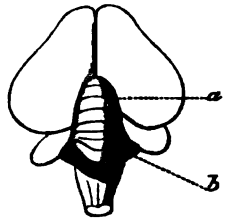
Fig. 1.

MAN. Diameter reduced one-half.

with the inferior. The whole locomotion is executed by the latter, while the arms are only used for lighter and more delicate labors.

If we compare with this the encephalon of a bird, we shall have a striking contrast. Fig. 2 is the brain of a gull—*Larus Bonapartii*—common on the western lakes. This bird has powerful wings, and feeble inferior extremities. Flight is an action which requires the utmost development of muscular power; accordingly in this, as in most other birds, the muscles which move the wings by far exceed in size all the other muscles of the body. Corresponding to this is the development of the middle lobe of the cerebellum, which overtops, and, in this view, nearly conceals the lateral.

Fig. 2.



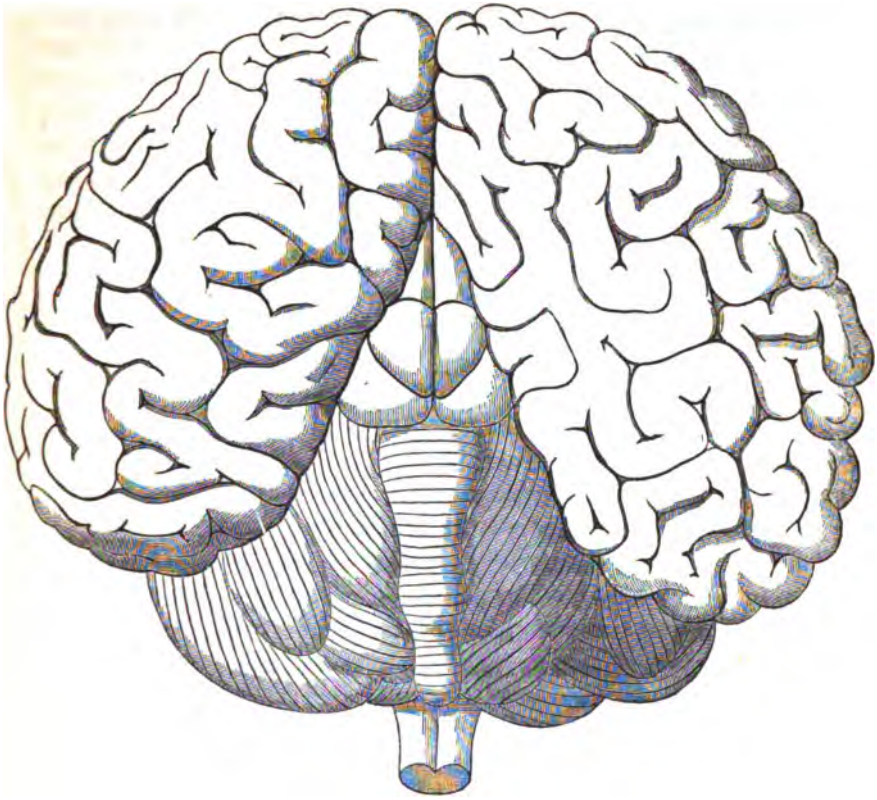
GULL—*Larus Bonapartii*. *a*. Middle lobe of cerebellum. *b*. Apex of lateral lobe.

The order of animals whose brain approaches nearest to that of man, in size and complexity, is probably the Cetacea. In external form, these animals resemble the fishes; and the wide difference between their skeleton, and that of other mammalia, has caused them to be ranked as the lowest order in the mammalian class, yet their cerebral development is among the highest.

The cetaceans are entirely destitute of the ordinary posterior extremities, but instead of them they have an enormous development of the caudal vertebræ which support a huge paddle, and are moved with force by a very powerful group of muscles. The anterior extremities are much feebler, and consist of a pair of paddles, of relatively little strength. The posterior group of muscles is, in the cetacea, the sole locomotive power, as much as in man himself, though moving a very different propeller; and they have the same superiority of bulk and strength over the muscles of the anterior extremities, or paddles. Hence, we may expect to find in them a similar proportion between the cerebellar lobes, as in man.

Fig. 3 represents the encephalon of the Dolphin. It is obvious at the first glance, that it conforms perfectly to the law, the middle lobe being overbalanced by the lateral, in the same decided manner as in man.

Fig. 3.



DOLPHIN. (From SERRES' Anatomie du Cerveau.)

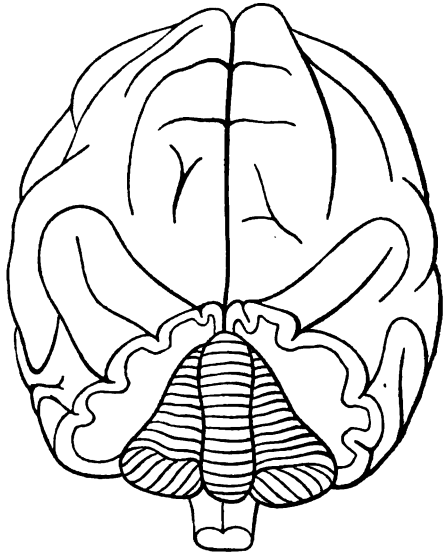
In the Mandrill, *Cynocephalus mormon*, a species of baboon, we find a greater development of the anterior group of muscles than in man, or the dolphin, and the posterior extremities, relatively less strong. Fig. 4 represents the brain of this animal, showing a marked increase of the relative size of the middle lobe, corresponding to the increased power of the anterior extremities.

If now we turn our attention to those animals in whom the anterior extremities are more powerful than the posterior, we shall observe a striking change in the proportion of the cerebellar lobes.

The family of Talpidæ, or the moles, are pre-eminently excavators, and are specially constructed with a view to their habit of piercing long passages in the earth. They accomplish this, not by carrying the earth out at the mouth of the burrow, as the marmots and squirrels do, but by a more rapid process. The mole thrusts

its broad, shovel-shaped hands into the earth, in front of its shoulders, and then, with a lateral motion, thrusts the earth away on

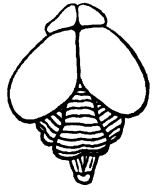
Fig. 4.



MANDRILL—*Cynocephalus mormon.* (FROM SERRES.)

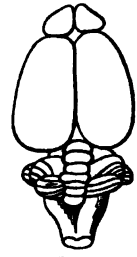
either side by sheer force of its anterior extremities. For this purpose, they have a prodigious development of the muscles of the shoulders and arms, while the hind legs are comparatively weak. In an individual of the genus Scalops, from Southern Illinois, I found the anterior extremities, with their muscles, to weigh two hundred grains, while the posterior weighed but sixty-six grains.

Fig. 5.



MOLE—*Scalops.*

Fig. 6.



RAT.

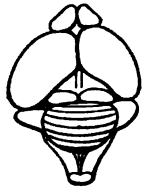
Fig. 5 represents the encephalon of this specimen, which, for the sake of comparison, is placed beside the brain of a common rat, Fig. 6.

It will be seen that, while in the mole the middle lobe of the cerebellum is the largest, because its *anterior* limbs are the most powerful in the rat, the lateral lobes are the largest, because its *posterior* limbs are the strongest. Other species of moles illustrate and confirm the law equally well.

Of all the mammalia, the bats are those in whom the anterior extremities most exceed the posterior in power. The action of flight requires great muscular strength; hence these animals have the same preponderance of the anterior group of muscles which we find in birds. In a *Vespertilio subulatus* I found the anterior extremities with their muscles to weigh thirty-two grains, while the posterior only weighed eight grains. In the bat, therefore, we should expect a great development of the median lobe of the cerebellum at the expense of the lateral lobes; while in the mouse, an animal of about the same size, but of stronger posterior limbs, we should look to find the lateral lobes predominant.

Fig. 7 is the brain of the red-haired bat, *Taphozous rufus;* and Fig. 8 is that of the common house-mouse, *Mus musculus*, and is placed beside that of the bat by way of contrast, the mouse being an animal in which the posterior extremities are the most vigorous.

Fig. 7.



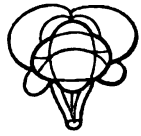
Red-Haired Bat—*Taphozous rufus.* Enlarged one diameter.

Fig. 8.

House Mouse. Natural size.

Fig. 9 is the brain of the little brown bat, *Vespertilio subulatus*, which, though differing in form, shows a similar predominance of the median lobe.

Fig. 9.



Silver-haired Bat—*Vespertilio subulatus.* Enlarged one diameter.

In birds, the general form of the cerebellum exhibits but little variety. That of the Gull, Fig. 2, will represent approximately the

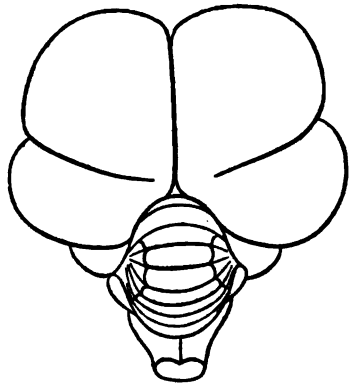
form in every species, from the ostrich to the swallow. In general, there appears to be a very marked predominance of the median lobe corresponding to the immense development of the muscular apparatus which moves the wings.

There is, however, a peculiar difficulty in comparing them with each other, owing to the obscurity of the line of demarcation between the lobes, so that it is generally not easy to define their boundaries. The cerebellum of all the birds is high in the middle, and much compressed laterally. On each side there is a small tubercle, which most anatomists consider as the sole representative of the lateral lobes. These tubercles are separated from the median prominence by a shallow semicircular groove which surrounds them, and which is usually taken to be the boundary between the lobes. But the fact that this groove maintains about the same position throughout the whole class of birds, regardless of changes in every other part of the encephalon, and the fact also that it exactly corresponds to the ridge on the inner surface of the skull formed by the projection inward of one of the bony semicircular canals of the internal ear, is ground enough for belief that it is a groove impressed upon the cerebellum from without, and does not represent any physiological boundary within.

The semicircular canals of the internal ear of birds are of great size, and with the cancellar structure surrounding them they occupy a very considerable space. The semicircular canals in a hawk are absolutely twice as large as those of a man, or nearly so. Accordingly, two thirds at least of the whole lateral diameter of the bird's head in the back part is occupied by the bony labyrinths of the ears. If the cerebellum, therefore, had the same relative lateral diameter as obtains in the mammalia, the addition of this immense auditory apparatus upon either side would give the skull a preposterous width, and seriously impede its actions in seizing its food, etc. The uniformly compressed shape of the cerebellum is, therefore, to be accounted for on teleological grounds. Two of the canals form projecting semicircular ridges on the internal walls of the skull, one upon each side. Beneath the arching ridge is a little pit or cavity. This little pit receives the lateral tubercle of the cerebellum, and the arched ridge or semicircular canal above it impresses upon the cerebellum the groove which surrounds the tubercle. It is evident, therefore, that the semblance of three lobes in the cerebellum of birds must be taken with some allowance, and not too implicitly relied upon. Owing to errors caused by this

appearance, I am satisfied that too little substance has hitherto been allotted to the lateral lobes in birds, and that the real boundary between them and the median lobe must be sought for nearer to the mesial line. I have sought in vain in most of the birds for any clear mark of division, but have found it in only one species at all distinct. Fig. 10 is the encephalon of the snowy owl, *Stryx nyctea*.

Fig. 10.



Snowy Owl.

In this case there was a slight but perceptible division between the median and lateral lobes of the organ, as may be seen by the figure. It was located nearer to the mesial line than the groove impressed by the semicircular canal, and consequently allowed more bulk to be assigned to the lateral lobes, though the median lobe was still predominant in size, corresponding to the power of the muscles of flight.

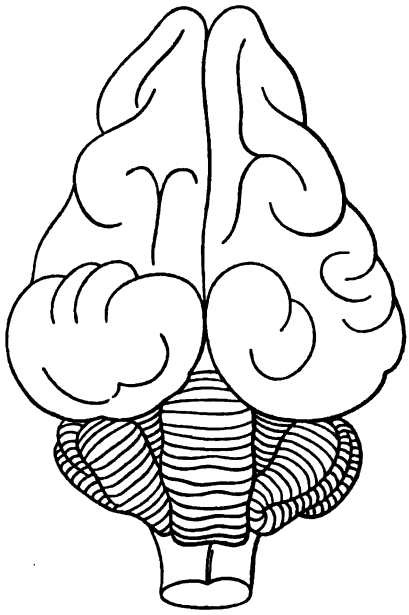
In the first part of this report, I alluded to certain exceptions to the law of the relation of the lateral lobes to the posterior group of muscles. Comparison shows, that while the lateral lobes have a certain correspondence with the group of muscles before mentioned, they have a not less striking ratio with the size of the hemispheres of the brain, and the rank of the animal in the scale of intelligence. There are, therefore, two conditions governing the lateral lobes as to size, which may be illustrated by three propositions:—

1. If the animal have large complex hemispheres of the brain, and at the same time very powerful posterior muscles, then both these conditions unite in demanding large lateral lobes of the cerebellum, and these organs, in fact, attain, under such circumstances,

their maximum development. This may be best illustrated by referring to Figs. 1 and 3, Man and the Dolphin. The other higher animals, who possess the same conditions, exhibit the same cerebellar ratio.

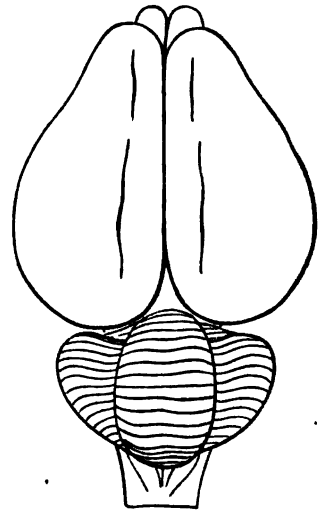
2. If the hemispheres of the brain be of a low grade, but the posterior extremities still powerful, then the deficiency in one condition is balanced by the excess in the other, and the animal will have lateral lobes bearing a moderate ratio of size with the median. One of the best examples of such a case is the Kangaroo. This animal like other marsupials is low in cerebral development, but it has a prodigous excess of power in the hinder extremities. Thus one condition balancing the other, the kangaroo is found to present a cerebellum whose lobes are tolerably well balanced in size.

Fig. 11.



GREAT KANGAROO—*Macropus Major*. (From SERRES.)

Fig. 12.

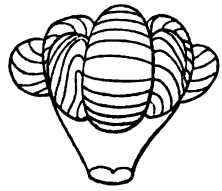


AGOUTI—*Chloromys*. (From SERRES.)

In the Agouti, we have an animal in whom, I believe, there is no remarkable preponderance of either pair of limbs, but the hemispheres of the cerebrum are still lower in development than in the kangaroo. Accordingly we find a still further diminution of the lateral lobes.

In the common wild rabbit of the Illinois groves, the cerebrum is simple and small, but as in the kangaroo, the hinder extremities are predominant in power, as compared with the anterior. Here the conditions balance again, and the lobes of the cerebellum preserve a fair and moderate proportion among themselves.

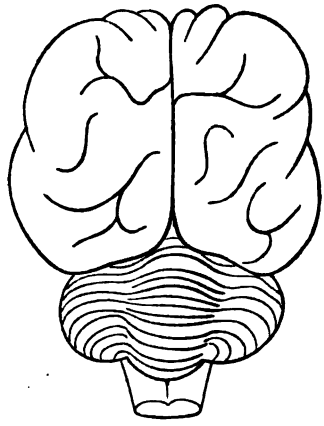
Fig. 13.



WILD RABBIT—*Lepus Sylvaticus.*

The Porcupine, *Hystrix cristata* presents an instance of a rather feebly developed cerebrum, which not being balanced by any unusual strength in the posterior extremities, results in a somewhat small pair of lateral lobes in the cerebellum.

Fig. 14.

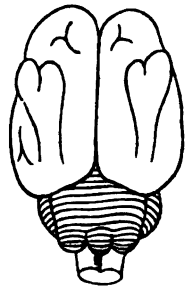


PORCUPINE—*Hystrix Cristata.* (From SERRES.)

3. If the animal have cerebral hemispheres of decidedly inferior development, and at the same time posterior limbs which are feebler than the anterior, then both conditions will coincide to reduce the lateral lobes to a bulk less than the median. This is well illustrated in the birds, Figs. 2 and 10; in the moles, Fig. 5, and in the bats, Figs. 7 and 9. Among larger animals it may be noticed in the encephalon of the sloth. This creature has anterior extremities some-

what more developed than the posterior, and at the same time very small cerebral hemispheres, both conditions demanding a predominant median lobe. Fig. 15 shows how well the law is carried out.

Fig. 15.

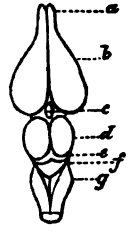


TWO-TOED SLOTH—*Bradypus Didactylus.* (FROM SERRES.)

It is proper to observe here, that in the view given, some portion of the lateral lobes is concealed from sight, so that the difference in size is not so exaggerated as at first appears.

In attempting to apply these laws to reptiles and fishes, we find great difficulties. The lobes of the cerebellum in the higher animals, constitute the chief bulk of the organ, and though they overlie several ganglia at their base, they are so much superior in size, as to manifest their relations quite clearly; but in the reptiles and fishes, the lobes are reduced almost to nothing, and the basal ganglia stand out and destroy the proportions of size. The cerebella of reptiles, however, are highly instructive in one point. They show us that the lateral and median lobes are in their simplest form, separate organs, having separate points of attachment to the cerebro-spinal axis. Fig. 16 is the brain of a small saurian, found

Fig. 16.



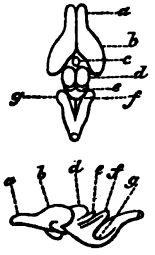
SAURIAN. Enlarged one diameter.

in the western States; *a*, is the olfactive ganglion; *b*, the cerebral hemisphere; *c*, the pineal body; *d*, the large anterior pair of the

tubercula quadrigemina; e, is the posterior pair of the same, and *f* is the whole cerebellum, as is generally asserted, but, as I think, represents only the median lobe. It is a small, flat, lunate lamina, supported by two peduncles, which run forwards—as the peduncles of the median lobe do in man—and are attached to the cerebro-spinal axis, beneath the tubercula quadrigemina. Behind, and upon each side of this we find a marked lateral prominence, which seems to me to represent the lateral lobe. It will be readily seen that, if the lateral lobes are as small in proportion, as the median, they would not constitute an organ at all larger than this ganglionic projection upon the *medulla oblongata*. It is clearly obvious, also, that the lateral lobes, in this case, belong to a position posterior to that of the median, although the median, leaning backward, in consequence of the pressure of the optic lobes, reposes its apex over the furrow directly between the lateral lobes. It is clear, also, that if these lobes were all to become largely developed, the median might adhere to the lateral, and occupy the position between them, which we see in higher animals. Thus, in the reptiles, we see the cerebellum analyzed, and displaying its typical form.

In the moccasin—a venomous snake found in Illinois—I find the lateral lobes projecting still more distinctly as a pair of tubercles, attached on either side of the *medulla oblongata*. Fig. 17 presents an upper and a side view of this brain, of the natural size. The letters refer to the same parts as in Fig. 16.

Fig. 17.

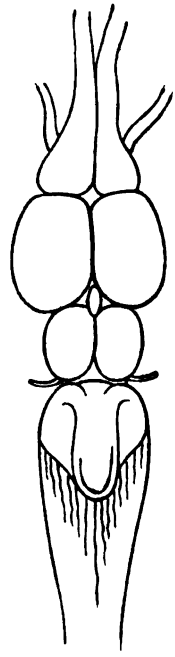


MOCCASIN—*Toxicophis piscivoris.*

Fig. 18 represents the brain of the sea turtle, of the species most used in our cities for food. Here we see the lateral and the median lobes much more perfectly developed than in the lower reptiles. The lobes adhere and fuse together, much as they do in birds, and leaving no line of demarcation, except a pair of very faint grooves

at the anterior part. The tendency of all these facts is to the following conclusions:—

Fig. 18.



Sea Turtle.

1. The division of the cerebellum which we have been considering, is traceable from the reptiles up to man.

2. The typical position of the lateral lobes is posterior to the median.

3. The median lobe has some function connected with voluntary motion, and its influence is expended chiefly upon the muscles of the anterior half of the body.

4. The lateral lobes exert a similar influence over the muscles of the posterior half of the body, and they are also in some way connected with the mental functions, inasmuch as they are developed to a certain extent in direct ratio with the intelligence of the animal.

5. The *nature* of the influence exerted by the cerebellum upon the muscles is not very clear. Although it may be true, that through it the mind co-ordinates the muscular action, yet that is *not* true which is stated by Carpenter and others upon the subject,

viz., that the size of the cerebellum is in a direct ratio with the number and variety of co-ordinated movements which the animal is capable of exercising.

Within the limits already explained, the size of the cerebellum is *directly as the quantity and power of muscular fibre to be moved*, with no regard whatever to the simplicity or complexity of their combinations. Thus, the co-ordinated actions of a squirrel are far more numerous and varied than those of a dolphin. A mouse co-ordinates more than a bat; a rat more than a bird; a cat more than a seal; a sloth more than a sheep; yet in these, and in a hundred other instances, the animal which co-ordinates least, has the largest and most complex cerebellum—the ratio being as the bulk of muscle to be used, and in the case of the lateral lobes, partly as the grade of the intelligence of the creature. It seems to me, therefore, that, while it may be true that the mind, through the cerebellum, co-ordinates motions, it does not do so because it possesses a specific function of co-ordination, but simply because its action is directly excito-motor, and the mind through it can select any muscle, or set of muscles, it may choose for action.

Serres, in his experiments, cut the *lateral lobes*, and the result was that the voluntary power of the muscle of the opposite side was *positively weakened, especially in those of the posterior extremities.* There was, according to his account, a *loss of force*, a *partial paralysis*, and not merely a loss of co-ordination. It is not my purpose, however, to detail, in this report, the results of experiments.

The conclusions offered are simply as the *direction* in which the facts of comparative anatomy point; but not as in themselves decisive, unless they shall be confirmed by a new and full examination of the facts derivable from experiment and from pathology.

REPORT

ON THE

TREATMENT BEST ADAPTED TO EACH VARIETY OF CATARACT.

WITH DRAWINGS ILLUSTRATING A CASE.

BY

MARK STEPHENSON, M.D.,
SURGEON TO THE NEW YORK OPHTHALMIC HOSPITAL.

REPORT ON THE TREATMENT BEST ADAPTED TO EACH VARIETY OF CATARACT.

WITH DRAWINGS ILLUSTRATING A CASE.

HAVING accepted the appointment to write an essay on the subject of cataract, I enter upon the assigned duty with hesitancy, believing that there are in this distinguished and learned body those who are more competent for the task than myself.

In looking over the *Transactions* of the American Medical Association, I have been not a little surprised that so interesting and momentous a subject should not ere this have engaged the attention of the Association.

The human eye is not only the most perfect and delicate piece of mechanism in the human frame, but it is also the most perfect of optical instruments.

When its refracting media, the crystalline lens or its capsule, lose their transparency, the rays of light are intercepted in their course to the retina, producing that condition in the eye termed "cataract."

The treatment of cataract must vary, depending upon its variety, consistency, the age and constitution of the patient, the natural development, or physical construction of the eye and its appendages.

What is applicable to lenticular, would not be proper in capsular; and the treatment required for a hard cataract would be improper in a soft, or fluid cataract—the method must be suited to the case, and not the case to the method.

It is conceded by the best ophthalmic surgeons wherever the science of medicine has made much proficiency, that medical treatment, in genuine cataract, is unavailing.

Here it is, that operative surgery justly assumes the rank and position of a science.

Various operations have been devised, from time to time, in different ages of the world; but they all may be summed up under the heads of *division*, *displacement*, and *extraction*, modified in each case, according to circumstances.

No man, who makes any pretensions to ophthalmic surgery, would adopt either one of these methods to the entire exclusion of the others. Each method has its advantages and disadvantages.

Thus, division, while it is the safest operation, is on the other hand the most tedious in effecting a cure; then, again, displacement, although an easy operation, is not usually the most satisfactory in its results—while extraction, the quickest in accomplishing the object designed, is the most difficult in its performance.

The selection of the method best adapted to each case constitutes, in the majority of instances, the secret of success, and will call into requisition much skill and maturity of judgment.

Preparatory Treatment.—Before attempting an operation for cataract, the judicious surgeon will not only revolve and settle definitely in his mind the method best adapted to the variety, or consistency of the "cataract"—looking carefully at it in all its bearings, but he will also examine minutely the constitution of his patient, ascertaining, above all things, whether there be any gastric, hepatic, nephritic or cutaneous derangements; the appearance of the various excretions, the tongue—state of the pulse, the process of assimilation and nutrition. If the tongue be clean, and the patient otherwise free from disease, there will be little danger of inflammation, and still less of destructive inflammation following an operation.

But if the tongue be white, or coated with thick yellow adhesive mucus, ophthalmitis, followed by disorganization of the deeper seated tissues of the eye, may be the sequel to an operation, where there exists so deranged a condition of the system. In regard to the whiteness of the tongue, Dr. Walton, surgeon to the Central London Ophthalmic Hospital, observes: "In the old, this organ is not so ready an index of the state of health as in early years; attention, therefore, should be paid to the urine, the deposition of uric acid, or the urate of ammonia, being a sure indication of dyspepsia, or excess of nitrogenized food, or of fever, and that of phosphate of lime, or the triple phosphate, of the opposite status of prostration and nervous depression."

These are conditions of the system of momentous importance, for it must be admitted that the previous and after-treatment are of

equal importance to the proper performance of the operation itself; the latter may be performed dexterously and gracefully, yet if the former be omitted, it will be of no avail.

Should the surgeon be incapable or disqualified to detect and treat successfully incipient inflammation in any of the deeper seated tissues of the eye, lymph may be deposited upon the serous membrane covering the retina, occlusion of the pupil, and synechia, or nebulous opacity of the cornea, may supervene before the surgeon is aware of what has occurred. The importance of having medical and surgical knowledge united in the same individual who attempts to practise surgery is fully illustrated in the preparatory and after treatment connected with operations for cataract.

It does not necessarily follow that a patient must go through a regular course of depletion, because he is about to submit to an operation. In many instances little or no change is required from the ordinary course of life, save a little abstemiousness and composure of body and mind for a few days; but, where functional derangements are found to exist, they must be corrected by such measures as the case may indicate.

Instead of a depletory course, it may often become necessary to give the patient vegetable tonics, with an alkali or chalybeates, and in some instances even stimulants, in connection with a generous diet, after an operation, especially if the subject of it has been accustomed to free living. Dr. Jacobs, of Dublin, makes the following truly practical remarks on this subject: "In preparing a patient for operation, I do not act upon the belief that empty bowels are essential to health, or what are called *feces* should not be found in the intestinal canal; on the contrary, I proceed on a conviction totally different. If a patient be in good health, notwithstanding an habitual retention of the contents of the bowels beyond the prescribed periods, I do not wish to risk an interruption of health by disturbing the natural functions of the stomach and bowels, and I therefore refrain from giving physic. "But if the patient be not in good health, I of course endeavor to bring him into that condition by every means in my power, and resolutely resist every attempt to induce me to operate until I have accomplished that object."

"It is usual," says the same author, "in preparing for this and other operations, to make great alterations in diet, substituting liquid for solid and vegetable for animal aliments. "This, how-

ever, must be done with caution, leading as it inevitably does to the disturbance of the digestive function."

Again, he reasons correctly when he says: "Without digestible, nutritious food, good chyle and blood cannot be produced, and without good blood local injuries are liable to suffer from destructive inflammation."

Prognosis.—In giving a prognosis too little thought is usually bestowed by the majority of practitioners, upon the dangers to be apprehended from subsequent inflammation of a destructive and disorganizing character; and it is for this reason that patients are not better prepared to submit to disappointment in cases of failure, and less disposed to exercise charity for the operator.

Before giving a favorable prognosis, due care must be given to ascertain whether the cataract is complicated with any other disease of the eye, and also to notice carefully whether there be any constitutional contraindications of a specific character, such as a strumous, arthritic, or rheumatic diathesis.

Dr. Mackenzie's remarks on this subject are very judicious. He says: "The dangers attending the operations for cataract are much too lightly estimated in pronouncing an ultimate prognosis. The risk of a badly performed operation, and that of disorganization from inflammation and other causes, after even the best performed one, are too much left out of view."

Again he adds: In the practice of one thoroughly acquainted with eye diseases, able to discriminate the cases fitted for extraction and those fitted for division, able to perform those operations well, and careful and skilful in the after-treatment, I should think three-fourths of those operations would recover useful vision; two-thirds excellent vision.

Dr. C. S. Fenner, of Memphis, Tennessee, in an excellent article on cataract says: "Patients with cataract often express considerable surprise when told that there is any doubt in regard to the final result of an operation." He says: "I have occasionally succeeded in making a perfectly clear pupil with but little improvement in vision, although previous to the operation the perception of light, and mobility of the *iris*, seemed to indicate considerable activity of the retina."

Dr. Fenner says: "The chances of success diminish after the age of fifty."

Statistics.—Dr. Tartra says: "It is generally thought that two out of five patients, operated on for cataract, recover their sight."

M. A. Saez, of the General Hospital of Madrid, reports 525 operations for cataract, of which 84 failed; he does not say whether the success in the remaining 441 was perfect or partial. Professor Roux, of Paris, reports 73 cures out of 115 patients operated on for cataract. M. Sichel furnishes, during a period of nine years, a record of 1026 operations on 641 patients, of which 783 succeeded, 114 were partially successful, and 117 failed entirely. Not more than three-fourths of the cases operated on at the N. Y. Ophthalmic Hospital have been successful. The ill success in some instances was justly attributable to the want of suitable apartments, and improper nursing.

Season of the Year.—The most of German and French surgeons are somewhat strenuous as to the season of the year when an operation for cataract is best to be performed.

In my humble opinion, more stress should be placed upon the state of the atmosphere than upon the season of the year.

In this country the first two vernal months, owing to frequent vicissitudes in the atmosphere, are the most exceptionable; but even those, if the patient be perfectly healthy, with no predisposition to inflammation, and has the comforts of home, well ventilated apartments, and a faithful and experienced nurse, little danger need be apprehended from the season of the year. A cold and damp atmosphere is objectionable either in autumn or spring, owing to the greater predisposition which it begets to rheumatic, catarrhal and inflammatory affections.

Dr. S. Littell, of Philadelphia, Surgeon to Wills Hospital for the Eye, makes the following judicious and philosophical remarks on this subject. He says: "There is not so much to be apprehended from the extremes of temperature merely, as from variations in the electrical constitution of the atmosphere; and we are careful, therefore, besides selecting the season when these are least frequent, not to perform an operation while a storm is impending. After the rain begins to fall, the electrical equilibrium is restored, and the danger from this cause is over."

Operations.—My object in this *Essay* is not to give the particular steps of each operation; those can be obtained from any of the text-books. I only aim to give a general view of them, and the mode

of performing them; with the comparative merits of the various methods of operating for "cataract."

DIVISION.

The merit of the suggestion, that cataract may be removed by absorption, if exposed to the aqueous humor by opening the capsule of the lens, is due to that distinguished surgeon Mr. Pott; but the profession is indebted to Mr. Saunders for establishing the fact by repeated operations.

In regard to the merits of the operation by solution, Dr. Jacob is very sanguine. He says: "The strongest argument in favor of this operation is, that it is the most easily performed; affording a valuable resource to the surgeon, who, unpractised in extraction, wishes to avoid the evil consequences of depression. Another argument, scarcely inferior in weight to the last, is, that the injury inflicted on the organ is much slighter than in extraction, where so extensive a wound of the cornea is made, or in depression, where the vitreous humor is necessarily lacerated and the retina frequently injured. If the objections to depression be well founded, recourse must be had to this operation in those cases where extraction is ineligible or impracticable."

There are two methods of performing this operation. One through the cornea at its outer margin; the other through the sclerotic, designated the anterior and posterior operations; the former termed Keratonyxis, the latter Scleratonyxis or Hyalonyxis.

Each of these methods has had its advocates. Those who give a preference to the posterior operation contend that it affords a greater facility for breaking up the cataract and remedying accidents that may occur in either method, without inflicting a double injury on the eye.

They also contend that the wound inflicted upon the cornea by the needle may give rise to an opacity of the cornea. But these arguments, in my opinion, do not counterbalance the many which may be adduced in favor of the anterior operation. In making an estimate of the advantages to be derived from the anterior operation, we claim that but one tissue is wounded; whereas, in the posterior operation, a number are wounded; that the cornea being the most feebly organized structure in the eye, is less disposed to inflammation than the sclerotic, choroid, ciliary processes, retina, and hyaloid membrane.

Dr. Jacob, of Dublin, whose knowledge of the anatomy of the eye is unsurpassed, and whose experience in needle operations is unequalled, sums up the arguments in favor of the anterior operation in a masterly manner. He remarks, with respect to the objection made to this operation on the score of its endangering the cornea, "I never yet saw vision impaired by an opacity caused by the wound of the needle, and very seldom, indeed, have I seen any opacity at all remain. In fact, as I have said elsewhere, I know no structure in the body which bears simple injury, such as a clean cut or puncture, better than the cornea. No anatomist, aware of the nature and number of the structures injured in the posterior operation, can for a moment assume that such injury does not cause more risk of destructive inflammation, than the injury inflicted on the cornea in the anterior one; and no surgeon, who has compared the effects and consequences of the two operations, can for a moment maintain, that the results of the puncture through the sclerotic are not more injurious than those following the puncture of the cornea." The testimony of Mr. Saunders, who practised both operations, should have great weight. He says (p. 149): "The surgeon has more power in the posterior than the anterior operation; but the latter excites less pain and inflammation, and inflicts a slighter, if any, injury on the vitreous humor."

Needles.—A slightly curved needle is decidedly preferable to the straight one, and in the anterior operation cannot be too fine, provided it is of sufficient strength to pierce the cornea. The curved needle, although not so easily introduced, or used with as much precision as the straight one, yet, when in contact with the lens, possesses more power and gives a greater facility in rupturing the capsule, and severing the opaque *lens*. Dr. Jacob (the author), to whom I have referred, many years since, impressed with the injurious effects of the ordinary sized cataract needle, used a fine sewing needle the 44th of an inch in diameter, curved and ground flat at the point, and an inch long in the blade. He says: "If the blade be longer, it will spring in using; if shorter, it will not reach as far as is necessary."

Dr. Isaac Hays, of Philadelphia, who has devoted many years of his professional life to the advancement of ophthalmic science, has invented an instrument for this operation, similar to an iris scalpel, which he calls "knife needle."

Manipulation.—In performing this operation, the surgeon should as much as possible studiously avoid displacing any portion of the lens. Sir Wm. Adams was in the habit of dividing the capsule and cataract freely, and then thrusting some of the pieces into the anterior chamber. But this practice is unnecessary—besides, these movable fragments of the lens in the anterior chamber are apt to irritate and inflame the iris; and in some instances produce an irritability of the stomach.

Should nausea and vomiting occur after an operation, from any cause, these distressing and protracted symptoms may be relieved by dilating the pupil with belladonna, or atropia, and giving internally an opiate, or an effervescing draught.

In operating either through the cornea or sclerotic, the safest plan is to avoid doing overmuch.

It is good practice to have the pupil under the influence of atropine for twenty-four or forty-eight hours before operating. Simply opening the capsule by a crucial incision, and then cautiously and delicately dividing the substance of the lens, is all that is required.

The process of solution and absorption is best accomplished in the natural position, as displacement of any portion of the lens in the anterior chamber is attended with unpleasant consequences. If both eyes are affected, a double operation by division may be performed at the same time—the advantage of this is that it saves time, and where the operation is safe, such a measure is justifiable.

Repetition of the Operation.—It was formerly the practice, and is still, with many, to repeat the operation every four or six weeks, until the process of absorption is complete. This I believe to be unnecessary. When the capsule remains open, and the lens is exposed to the action of the aqueous humor, a single operation will generally accomplish the work; solution, when once commenced, seldom stops until completed. Frequent repetition is objectionable on the score of increasing the liability to inflammation. A single repetition, or even a second repetition of the operation, may in some instances be unobjectionable, but as long as the process is going on, and there is no special necessity for haste (one eye being yet unimpaired), I see no valid reason for a frequent repetition of the operation. One author says he has watched the process of solution as it has progressed, examining the eye from week to week with a strong magnifier, and he could distinctly see the gradual diminution of the cataract.

Some five years since I had an opportunity of observing the same thing in an interesting child, between three and four years of age, upon whom I operated for traumatic cataract. I performed the anterior operation, with a small curved needle (one which I had often used before, and with success) by simply opening the capsule with crucial incisions and dividing the lens. There being no haste in this case, one eye being good, I determined to test what the efforts of nature with time would accomplish, without a repetition of the operation. At the expiration of one year I had the accompanying drawing (No. 2) made by a competent artist (H. A. Daniels), which gives a correct representation of the lens as it then appeared, a portion of its surface looking as thin as a cobweb; at the expiration of six months more, I had a second drawing (No. 4) made, showing that the work of diminution was steadily yet slowly progressing. When the last drawing was taken, it looked as if it had been chiselled, or squared on its margins, and as if orifices had been made with some instrument in the centre of the lens; or, in other words, like a crystalline substance that had become pervious by partial solution. No. 1 represents the appearance of the eye previous to the operation, and No. 3 is a magnified view of No. 2, and No. 5 is a magnified view of No. 4. Soon after the second drawing was taken, to my great regret, the parents of the child removed to California, and (although they promised to write to me) I have never heard from them since, but I have no doubt as to the final result.

This case is interesting, and proves to my mind a practical fact which I have long entertained, that the frequent repetition of the operation is unjustifiable.

I should have repeated the operation in this case, had there been any evidence that the process of solution had ceased. I have known cases that were doing well, and would have terminated well but for the impatience of the surgeon, who repeated, and repeated, and continued to repeat, until he repeated once too often, and the result was entire loss of vision.

Is it proper to operate when one eye is sound?—This is a controverted point, and one upon which many arguments have been advanced against surgical interference. My individual opinion, or answer to the question (confining it to the operation for solution), is in the affirmative. The opponents, or those who take the negative side of the question, assert that the difference in the focal dis-

tance of the two eyes, after the lens in one has been removed, will give rise to double vision. This objection to the operation I have long since proved to be fallacious, and have so instructed my ophthalmic pupils, in my annual course of lectures.

I had an opportunity of testing this question at the N. Y. Ophthalmic Hospital a few years since.

A beautiful young woman was brought to the institution by the matron of the Magdalene Asylum, who had a cataract in one eye, while the other was perfect. She could not endure the thought of having such a blemish in one eye; she also was annoyed by persons looking at it, and questioning her about it; was unable to see objects distinctly on that side, without turning her head towards the shoulder, which gave her an awkward appearance; and for these reasons, she wished the cataract removed.

After examining the appearance of the lens—considering her age, and learning the history of the case—I came to the conclusion that the cataract was soft, and resolved to perform the anterior operation for solution. I did so in the presence of my colleague, Dr. J. P. Garrish, my son, Dr. M. P. Stephenson, and my ophthalmic class. No untoward symptoms of pain or inflammation occurred, although she had to go three miles immediately afterwards, in returning to the asylum. In eight weeks the cataract was entirely removed; and, what was still more pleasing, she could see with that eye as perfectly as the other, there being no confusion of vision whatever. The matron of the institution—a Christian lady in the fullest sense of that term, and in whose veracity I have the strongest confidence—informed me that this young woman could, without the aid of glasses, sew the finest linen cambric muslin with that eye. From what I saw of her, when she returned to the hospital the last time, I am satisfied the statements of the matron were, in every particular, strictly correct. She soon afterwards returned to England, her native country.

Now this seems strange, and is a problem which I cannot solve, unless it be that a new lens, or something of the same consistency and translucency, is reproduced, or secreted, which answers the purpose of the original one. Mr. Walton, in his *Treatise on Operative Ophthalmic Surgery* (p. 476), says: "From the power the eye, unaided by spectacles, has sometimes acquired after an operation, particularly in children, it has been supposed that the crystalline lens may have been wholly or partially reproduced. Its reproduction in some of

the lower animals has been often proved, and there seems to be a possibility of it in man."

It is said by Mr. W. Jones, that Textor has observed it in the human subject, and Valantine has discovered by the microscope that the regenerated substance possesses the same intimate structure as the lens. In a publication of Guthrie's, in 1834, on the certainty and safety with which the operation of extraction of cataract from the human eye may be performed, &c. (p. 43), an instance is given of what the author considers to be regeneration of the lens. "Anne Wholly, aged 23, came under my care nine years ago, when 14 years old, having congenital cataract of both eyes, on which I operated with success. Some circumstances induced her mother to go out of town suddenly, before the eyes were quite clear, and I did not see her again until the 11th of March last, when a small portion of the capsule appeared to impede vision at the lower part of the pupil of the right eye, the left being quite free. Supposing that the removal of this portion of capsule would improve her sight, I proposed it to her, and on doing it, I found to my great surprise that the lens had been reproduced, and was quite transparent. It became of course opaque, and is now dissolving in the usual manner."

Mr. S. Cooper asserts that confused vision, said to arise from the cause under consideration, "is a gratuitous supposition, inconsiderately transmitted from one author to another." (Vide *Surg. Dict.*, p. 297.) I. V. Solomon, surgeon to the Birmingham Eye Infirmary, in a *recent article* on this subject, says: "The objections that have been raised to operative interference are two in number:—

1st. That the vision, in consequence of the unequal adjustment of the two eyes, must be confused.

2d. That the operation may endanger the safety of the sound eye, by exciting sympathetic disorder.

In regard to *the first*, my experience will show that confused vision is the exception, not the rule, and, when present, can be readily corrected by a cataract glass. It may be added that, in the course of the nine years I have been officially connected with the Birmingham Eye Infirmary, no patient has ever complained to me of the result of the operation, but many have testified their satisfaction.

The objection to the *second*, that the operation may be the cause of sympathetic inflammation in the other eye, is a myth, which a few months' attendance at an eye infirmary, where trau-

matic and other cataracts are submitted to operation, will effectually dissipate."

I am happy to find that Dr. C. S. Fenner, of Memphis, Tenn., previously referred to in an article on the subject of "cataract" published in the January No. for 1858 of *North American Medico-Chirurgical Review*, concurs in the opinions and views which I have *long since* expressed on this subject. He says: "In young persons, with single cataract, I usually advise an operation, if the disease is uncomplicated, and the general health and constitution of the patient good. Severe inflammation rarely follows operations for cataract on healthy young persons, consequently the risk of destructive inflammation extending to the sound eye, is too small to be calculated on. The objection often made to an operation, that the difference in the focal distance of the two eyes, after the lens in one has been removed, will give rise to double vision, I have found not to hold good.

"Patients on whom I have operated in such condition, have uniformly expressed themselves as gratified with the result; the deformity has been removed, and the scope of vision extended. In young persons, after the removal of the lens, the eye gradually accommodates itself to the loss, and patients often have very good and distinct vision without the aid of cataract glasses: the younger the person, the more perfect the sight becomes without magnifiers. Very few persons have the two eyes in every respect precisely of the same power, yet very few indeed have double vision."

Dr. Mackenzie says: "It is rarely the case that the two eyes, even in the same person, correspond in refractive power. The left, partaking perhaps in the tendency to weakness and disease which so frequently attaches itself to the left side of the body, is often found to be short-sighted. Few are aware of the disparity which often exists between their eyes, until some accidental circumstance leads them to make a comparative trial of the two; and it is by no means uncommon to meet with individuals, who, on making the experiment, have discovered that one eye was greatly defective, or even entirely blind."

The objection, that an operation endangers the other eye from the liability to engender inflammation, has already been shown to be erroneous, especially in the operation for solution; and, if it be true—as we think has been fully proved in the preceding remarks—that confused vision does not necessarily result from operating upon one eye, while the other is unimpaired, or in its natural con-

dition, why do surgeons, when a person has a full-formed cataract in one eye, and retains the vision of the other, advise the postponement of the operation until that also is dark? Much reflection and observation have satisfied me that this *advice* is *erroneous*. The disposition of the retina to lose its vigor by the permanent exclusion of light, is an additional argument in favor of operating.

Unpopular as the doctrines of operative interference is in New York, my experience warrants me in saying, the advantage from operating is, that time is saved, without incurring much if any risk to the unimpaired eye, as the process of solution can be going on in the opaque lens, and be entirely dispersed by the time distinct vision is lost in the second eye. Although not prepared to advise such a step indiscriminately, yet I am of the opinion there are many cases and circumstances which would warrant the propriety of such a course, especially where there is a strong probability that the cataract is soft.

Congenital Cataract.—The operation by division is the one especially adapted to cases of congenital cataract, and should be done before the period of dentition commences—from the 2d to the 4th month is the best time. It should be done before much effort is made by the child in endeavoring to see objects, otherwise an oscillating condition of the eye is apt to remain in after life.

Dr. Jacob is of the opinion that nearly all cataracts, before the age of fifty years, are adapted to the operation of division.

Anæsthetics.—It is seldom that I have resorted to the use of chloroform and ether in operations upon the eye, yet in cases of congenital cataract they are of decided benefit. It enables the surgeon to perform the operation with the utmost facility and without any predisposition to inflammation of the eye, or congestion of the conjunctiva, which the struggles of the child and spasmodic action of the orbicularis are apt to produce without the use of this agent.

DISPLACEMENT.

Celsus, who lived soon after the commencement of the Christian era, describes this operation, and is generally supposed to be the inventor of it.

There are various modifications of it, such as *depression*, *reclination*, and *lateral traction*. But in either of these operations the lens

must be removed from the axis of vision and buried in the vitreous humor, producing a serious laceration in the hyaloid membrane, covering and intersecting the vitreous humor.

In so severe an operation as that of displacement, there is always more or less danger of destructive inflammation in this delicate tissue, accompanied with iritis, retinitis or choroiditis, followed by impaired vision, and in some cases by an amaurotic condition of the eye. It is not unusual for subacute inflammation to supervene several weeks after the operation, at a time, too, when the patient and the surgeon are flattering themselves that all danger is over. When we consider the severity of the injury inflicted upon the most delicate portion of the eye, it is a matter of astonishment that vision is not destroyed in every case. The old method of depression, or couching as it was anciently termed, is more objectionable than that by reclination, for the simple reason that the pressure of a hard cataract upon the iris, ciliary processes, and retina, is liable to beget an inflammation in these exceedingly sensitive membranes, especially in their serous coverings, which eventually terminates in the effusion of lymph, or a total paralysis of the fimbriated nervous papillæ entering into the composition of these tissues.

This state of things is marked by a congested condition of the vessels in the conjunctiva, a turbid appearance of the aqueous humor, intolerance of light, increased lachrymation, flaccid condition of the tunics of the eye, a feeling of tension in the ball of the eye, tenderness to the touch, and pain extending to the extreme branches of the ophthalmic branch of the fifth pair of nerves. The supra-orbital pain is often of an intermitting character, having regular nocturnal exacerbations, and almost entire remissions by day.

The posterior operation possesses so decided an advantage over the anterior method, that it should always be selected either for depression or reclination. The advantage which reclination has over depression, is, that the lens, instead of being vertical in its position after the operation, lies horizontally with its broadest surface downwards, its superior edge backwards, and is in a measure buoyed up by the elasticity of the vitreous body, provided it be in a healthy condition. But place it in the most favorable condition that can be devised, still it acts like a foreign body in the eye, and must in the nature of things be a source of irritation. Lawrence and Mackenzie both bear testimony to the frequent recurrence of a destructive internal inflammation, after depression or reclination, especially the former, ending in disorganization of the eye.

Notwithstanding these detracting evidences, *displacement* is the operation generally preferred by American surgeons, while in England and Germany it is in disrepute.

My former colleague, Dr. David L. Rogers, always performed the operation of lateral displacement by the anterior or keratonyxis method, and usually with remarkable success. Whenever I have performed the operation of displacement, it has usually been by reclination and by the posterior method.

Indeed, to me it would seem difficult, if not impossible, to recline the lens in any other way than by passing the needle through the sclerotic. In the operation of displacement through the cornea, there is not the same freedom in the use of the needle, nor can the lens be carried as far back into the vitreous body.

As I have had no experience in the operation termed by my learned and esteemed friend, Prof. Pancoast, *lateral traction* or *horizontal displacement*, and as the method is peculiarly his own, I wrote to him, requesting him to give me a description of it; and in reply he politely furnished me with the following communication:—

"The place of puncture for my peculiar operation for the cure of cataract, by horizontal displacement, is through the sclerotic coat, a little above or below the horizontal diameter of the eye, and just behind the commencement of the non-plicated portion of the ciliary body. I use an angular hooked needle of delicate dimensions. The moment the hook has fairly entered into the anterior portion of the vitreous humor, I incline the handle of the instrument backwards, so as to be able to carry the convex part of the hook gently forwards, breaking through the zonula pellucida, just at the outer side of the lens, so as to get it in front of the lens, without touching the ciliary processes or iris. To allow this to be done without running the risk of unseating the lens, it is necessary to have the pupil thoroughly and firmly dilated. I then break up the capsule with the cutting point of the needle, fix the hook in the centre of the lens, and gently slide it horizontally backward along the route through which the needle has passed, until it comes opposite the place of puncture; when by gently rotating the needle and depressing the handle, I leave it securely lodged at the outer part of the vitreous humor, and not pressing with any force against the retina. I open of course some of the cells of the hyaloid, and if a little of the humor exudes through the puncture, which I believe to be rather beneficial than otherwise, the only precaution I take, is to evacuate it, by raising with the forceps and then snipping away a

small portion of the conjunctiva, in order to prevent the infiltration of the fluid under the conjunctival fascia. It is exceedingly rare for my patients, after this operation, to have so much pain or inflammation as to require bleeding, leeching, cupping, or blistering And when such is the case, it is usually the consequence of a bad light, or some maladroitness by which I have either entered the needle a little too far forwards, or rubbed it against the ciliary processes or iris. The principal merits which I claim for the operation are these: The absolute avoidance of disturbance of the iris, either by the needle or the movement of the lens (the bad effects of which disturbance soon making themselves apparent, as we well know), or of the ciliary body and processes, the injurious consequences of which are so apt to show themselves, in the old method of couching, either quickly by throbbing pain, inflammatory turgescence of the ciliary processes and elevation of the lens; or more slowly by an insidious choroido-retinitis (if I may be allowed to join Greek to Latin in this way), which causes photophobia, lachrymation, circumorbital pain, and may finally eventuate in some form of amaurosis. Another advantage is the avoidance of the risk in couching either with or without reclination, of having the lens pressed down against the ciliary border of the iris, or against the ciliary processes, the disturbance of the anterior mechanical connections of the tunics at the zone of Zinn, where the vessels of so many parts concentrate, and the ploughing up of the retina, in the efforts which often require repetition to fix the hard lens in the lower and anterior part of the vitreous humor, to prevent its subsequent elevation, which is nevertheless very apt to occur. One important feature in my operation, not to be lost sight of, is this, that the route which the needle makes in its passage is the one which the lens is made to take in its withdrawal from the axis of vision, and that I avoid thereby the strangulating or rupturing pressure of the anterior portion of the vitreous humor, through which, as well as through the vascular ciliary body, the needle is made to pass in the old operation for couching (as I suppose most persons will be ready to admit), when the needle inserted horizontally is made to descend to the bottom of the eye, forcing the lens through another laceration in the hyaloid tunic, and breaking up to some extent the delicate, vascular, mechanical connections, consisting of the zone of Zinn, the ciliary ligament, and annulus albidus, by which the hyaloid tunic, the retina and choroid, iris, cornea and sclerotica are connected together; where in fact the blood-

vessels of all the tunics of the eye converge, inclusive even of those on the anterior part of the sclerotic coat, the slightest injury of which mechanical connections is so apt to lead, sooner or later, by a series of well-known phenomena, to amblyopia, or complete amaurosis. I believe, from what I have seen in coloboma of the iris, that inflammation of these structures, attended as it usually is with the inflammatory zonular striæ on the exterior, has a great tendency to spread circularly round and sometimes open them by ulceration, and even discharge the lens. Couching by keratonyxis, I deem a very objectionable process. Couching by sclerotonyxis in the ordinary method I consider, for the reasons urged, amenable to all the objections now brought against it at home and abroad. Nor do I think it at all judicious to attempt to divide a lens in place, so hard or tough as to offer sufficient resistance to the cutting edge of the needle as to cause it to change position or to revolve in its bed. Such cataracts I treat either by extraction, by the upper section, or by my process of horizontal displacement, according to the appropriateness of the case for either operation. In cases of double cataract, nearly equally suitable for either operation, I often apply the displacement process upon one and the extraction upon the other eye, as you have observed in my practice. A case of absolutely hard cataract, into which the needle would not enter, I believe should always be extracted, and if the surgeon in this rare form of the affection should not make the discovery until after the introduction of the displacement needle, it would be better to push the lens forward, and remove it by extraction. I practise extraction and displacement nearly equally. Extraction gives, as we well know, with all its risks of deformity, in its successful cases, the most perfect results that could be wished. I would not give up either process. But if I was forced to limit myself to one, I would adhere to my plan of displacement. This method was almost forced upon me many years ago, when I thought it was nearly impossible to devise anything new for the removal of cataract, by observing again and again in my lectures on the eye, the transparent structure called the zonula pellucida, intervening between the margin of the lens and the peculiarly sensitive structures of the ball, giving space enough for the introduction of a needle, with but little risk of injury to any important part.

"In soft cataracts, I of course, like every body else, cut them up, using for that purpose a delicate knife needle, such as is described in my *Surgery*. Or, if there is a hardened nucleus clearly apparent,

I use my angular needle, break up the softer structure and displace the central part. If there is no hardened nucleus, I often puncture the cornea and remove the soft lens by the process called *linear extraction.*"

EXTRACTION.

The operation of extraction is comparatively of modern date; and, like that of displacement, is only suited to hard cataracts.

Mr. Daviel, a celebrated French surgeon, is entitled to the credit of having first performed the operation of extraction; the particulars of which were published to the world but little over one hundred years ago. The operation, as described by its inventor, was not only painful to the patient, but also complicated and embarrassing to the surgeon; this, doubtless, was owing to the great superfluity of instruments required for its performance. Baron de Wenzel, Richter, and other distinguished advocates for the operation, by their combined talents, so modified and simplified the process as to render it more in accordance with the present improved method of operating.

The operation of extraction, although confessedly the most delicate, difficult and imposing, is nevertheless the most satisfactory, when successful, of any in surgery. Its difficulties, however (judging from my own experience), have been greatly magnified. I admit that Baron de Wenzel is reported to have said that he had spoiled a hatful of eyes before he had learned to extract; but this, doubtless, was a mere figure of speech. Its difficulties are very much lessened by selecting an eye adapted to the operation. Extraction, without doubt, is the preferable method for the removal of hard cataract, where the surgeon has the requisite mental and physical qualifications for the task; having, in other words, a cool head, a sound judgment, a keen eye, a stout heart, a firm, steady, and dextrous hand.

But notwithstanding these combined qualifications in the operator, unless the patient have a tolerable prominent eye, a large palpebral opening, a spacious anterior chamber, a movable iris, a natural pupil, and a healthy or sensitive retina, the judicious surgeon would be deterred from attempting an operation for extraction; whereas an injudicious operator, by proceeding under unfavorable circumstances, not only jeopardizes his own reputation, but also brings into disrepute a valuable operation. When extraction is

skilfully performed, the chances for recovering and retaining vision are infinitely greater than after displacement.

It is doubtless for this reason that British and continental surgeons give it the preference whenever it is practicable. Secondary or subacute internal inflammation of a disorganizing character is less likely to follow extraction than depression.

An Edinburgh surgeon, who has recently returned from a tour of observation through Germany, says: "It is regarded almost as an axiom at the Vienna school, that if the case be well selected, and the operation be adroitly performed, extraction is, beyond all comparison, the most satisfactory procedure for all concerned. At the same time, it is maintained that it requires considerable skill and practice, so that when individuals are so placed that they have not every advantage, they are then prone to look about for arguments against it, and for reasons why other methods should be preferred, which in reality amounts to an admission that extraction is too difficult for them. Hence the rarity of good extractors, and these being almost confined to capitals and other large cities, and to few even in them; hence so many preferring other operations—seldom or never having recourse to this one; hence, also, the many objections brought against this operation, which those who are skilful in its performance know nothing about, finding it truly successful and free from injurious consequences." Mr. Mackenzie's remarks on this subject are worthy of note. "That extraction," says this practical writer, "is the proper mode of removing a hard cataract, is an assertion, of the truth of which those who have had any considerable experience in the treatment of the eye diseases appear to be as firmly convinced of, as they are that soft cataract may safely and satisfactorily be cured by division."

Chloroform or ether is objectionable in this operation, for fear of its producing nausea and vomiting. Nor is it advisable to operate upon both eyes at the same time in cases of double cataract. If the lens removed is found soft at its periphery, it is better to use the needle on the second eye, rupture the capsule, allow time for solution, and extract the nucleus at a subsequent operation by a small opening in the cornea. An intelligent assistant, one who knows the various steps in the operation, and the proper method of holding the lid and steadying the ball of the eye, is of the greatest importance in the operation of extraction.

When the patient is of a nervous temperament and wanting in firmness, the horizontal position is the best.

Every step in the operation, and every accident that may occur, should be carefully revolved in the mind of the operator, and he should be prepared for any emergency. Although the surgeon in his first attempt may feel that he needs the eye of an archer, while puncturing and counter-puncturing the cornea—the skill and precision of a pilot, who has Scylla on the one hand, and Charybdis on the other, in his transit through the anterior chamber, yet all this may be acquired by practice.

Section.—The section may be made through the *lower half*, the *outer* and *lower* or *upper half* of the cornea.

The section through the lower half, although more easily formed than in the upper, does not possess the intrinsic merit of the latter.

The dangers incurred by a section in the lower half of the cornea are fourfold:—

1st. There is more liability to prolapsus of the iris.

2d. More risk of an escape of the vitreous body.

3d. More probability that the cicatrix may interfere with vision.

4th. More danger of interruption to the process of union by the first intention.

When a section of the cornea has been safely made, the most difficult and dangerous part of the operation has been accomplished. I shall not, therefore, speak of the subsequent steps in the operation.

The secret of success in making the flap in the cornea, consists in dexterously yielding to the movements of the eye, until the counter puncture of the cornea is made, keeping the blade of the knife, while steadily progressing, parallel with the plane of the iris, until it cuts itself out. The section should be made by a continued and steady movement of the knife.

Before closing the lids after the operation is completed, the iris, if prolapsed, should be replaced in its natural position, and the edges of the cornea brought in coaptation.

After-Treatment.—This must be varied according to the exigencies in the case, but if the preparatory treatment has been such as it should be, before commencing the operation, the subsequent medication will usually be of minor importance—depletory measures may be required, or directly the opposite course may be demanded, depending upon circumstances.

Inflammation of a subacute character may supervene several

days after the operation, attended with severe pain in the eye and supra-orbital region—a red and swollen condition of the palpebræ, serous chemosis, and unhealthy secretion covering the conjunctiva.

Should the character of the inflammation be mistaken, and active depletion resorted to, the symptoms would all be aggravated, and, if persisted in, would terminate in destruction of the eye.

The pain, the œdema of the lids, the tenderness to the touch and the restlessness of the patient are apt to deceive the inexperienced surgeon; but the constitutional symptoms will aid in arriving at a correct solution of the disease; such cases are usually accompanied with diminished action of the heart, a feeble and quick pulse, with a depression of the vital powers.

Where a doubt exists as to the pathology of the case, the safest plan is to have recourse to diffusible stimuli, such as carbonate of ammonia, or camphor mixture combined with a small portion of morphine, and a nutritious diet. If these remedies relieve the pain and other symptoms, the diagnosis is clear; but, on the contrary, if the inflammation is increased by such measures, general or local depletion should be commenced with immediately.

Mr. Tyrrell, in his admirable work on diseases of the eye, cites a case illustrative of this principle; he says: "In the summer of the year 1835, I operated upon one eye of a gentleman, aged nearly 70; he was of a spare habit, and had rather a weak circulation; but stated that he had usually enjoyed good health, and that he had always been moderate and temperate in his living. After the operation I allowed him to take some good soup, but no wine or beer; and for four days he had not any untoward symptoms; the section of the cornea appeared to be well united, and his vision was good; though I did not permit him to make use of it. On the fifth day I was surprised to find that he had suffered from severe pain in the eye, on the preceding night; and that the palpebræ were much swollen and slightly red; on exposing the globe, a little thin opaque secretion escaped from the conjunctival surface; the conjunctiva appeared red and elevated by serous deposit, and the section of the cornea was found open, with a small portion of the iris protruding through it. I suspected that the patient had received some violence to the globe, which had burst the section. But on hearing the particulars of the unfavorable change, I was soon satisfied that no injury had been inflicted.

"The gentleman had felt unusually depressed on the previous evening, and soon after he had gone to bed, his eye began to feel

uneasy; and this uneasiness had gradually augmented, until it amounted to pain, sufficient to cause great distress, which continued at the time of my visit to him, and at this time his pulse was very feeble; he felt chilly and complained of excessive muscular debility, and depression of spirit.

"I immediately directed the patient to take some warm brandy and water, and prescribed a mixture of compound spirits of lavender, tincture of opium and camphor mixture, of which he was to take a dose, every three or four hours as long as the feeling of excessive debility existed. I advised him to have small quantities of nutritious food frequently in the day, with wine, or brandy and water, as he felt inclined. In the course of the day the suffering subsided, and his general feeling became more comfortable; but I was obliged to continue the use of the medicinal and general stimuli for a few days before the local action became healthy; in the mean time, the ocular mischief did not extend. The gentleman recovered with good vision, though with a disfigured pupil; but nearly three months elapsed before the section was perfectly and securely closed."

It should be remembered that subacute inflammation is just as likely to destroy an eye as the acute, unless appropriately and timely treated. The pain and suffering are often as severe in the subacute as in the acute, and yet the treatment required in each case is entirely different. A faithful and intelligent nurse is indispensable; one who will watch the patient night and day, regulating the diet, temperature of the room, and ventilation of the apartments. Until the wound is perfectly healed, the hands of the patient should be muffled or secured to each other, and absolute rest and quietness strictly enjoined. The lids should be closed and secured in that position for three or four days by strips of court plaster.

Linear Extraction.—Mr. Critchett, at the London Ophthalmic Hospital, has recently practised an operation, which has been in vogue with German surgeons for several years, and called by them "linear extraction," from the opening made being only a line in width; but which to my mind might with more propriety be denominated "paracentisis lentis." The operation is performed by puncturing the cornea on its outer margin, with a broad needle, and with the same needle lacerating the capsule and breaking up the lens. A channelled curette is then introduced into the opening made by the needle, and the contents of the capsule escape along

the groove of the curette. Mr. Bowmen has adopted the same method with equal success.

The operation, it should be remembered, is only applicable to entirely soft or fluid cataracts.

CAPSULAR EXTRACTION.—After the operation for solution, displacement, and extraction, an *opaque capsule* may intercept the rays of light. The capsule may cover the *entire pupil*, or only a *portion* of it. It may be *thin*, *semitransparent* or *densely opaque;* have a *single* attachment, or may be adherent to the *entire circumference* of the pupil. In *texture* it is usually *firm*, *tough* and *unyielding* to the instrument, requiring considerable force before its division or detachment can be accomplished. It may be *stationary*, or some portion of it *floating* in the aqueous humor.

The safe and effectual removal of an opaque capsule from the axis of vision, till within a very recent date, was a great desideratum. But with the aid of the modern *capsule forceps*, *canular scissors*, and *guarded iris hooks*, the difficulties in this exceedingly delicate operation have been in a measure overcome.

These beautiful, delicate, and ingenious instruments enable the surgeon to seize or divide a capsule or false membrane and remove it from the range of vision. In relation to the *sharp-pointed* capsular forceps manufactured by Luer, of Paris, and others, I fully concur with Dr. Mackenzie, who is of the opinion that too great an injury is inflicted upon the eye by the force required in piercing the cornea or sclerotica with this instrument. Therefore, until greater delicacy is attained in its construction, I think the safer method is to make a small opening with an extraction knife in the upper and outer part of the cornea, even at the expense of losing a portion of the aqueous humor, pass the blunt canular forceps through the opening, seize and extract the capsule. Where this cannot be done with safety to the iris or ciliary tissue, owing to the strength of the adhesions, the forceps should be withdrawn; and in its stead through the same opening Bowmen's blunt pointed canular scissors may be introduced, the capsule severed from its place of attachment, and then extracted by Schlagintweit's guarded iris hook, or Charrière's canular forceps. Where the capsule is firmly adherent to the iris, producing an occlusion of the pupil, Sir Wm. Adams' operation may be resorted to, for making an artificial pupil, or Tyrrell's operation for drilling.

More might be said on the treatment of "Cataract," yet, much more would perhaps be inappropriate on the present occasion.

My object in this essay has been to discuss certain controverted principles, rather than to go into a lengthy examination of the subject, in all its minutiæ.

MARK STEPHENSON.

194 Fifth Avenue, New York,
May 1st, 1858.

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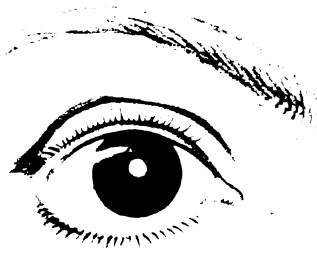

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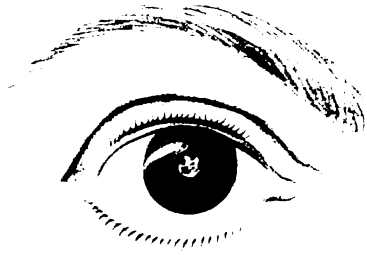

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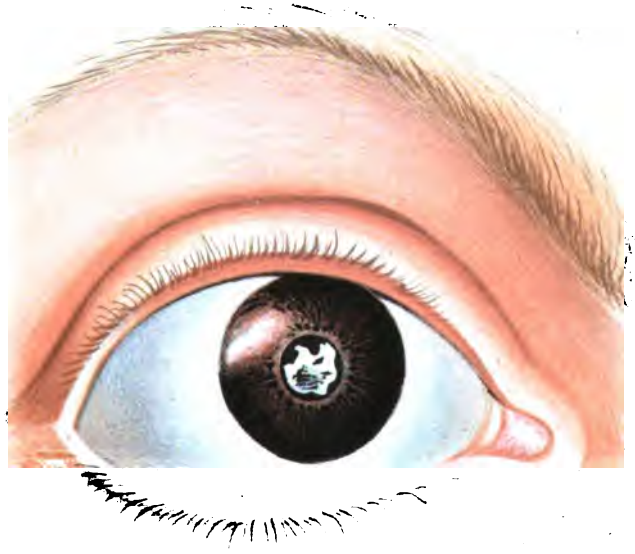

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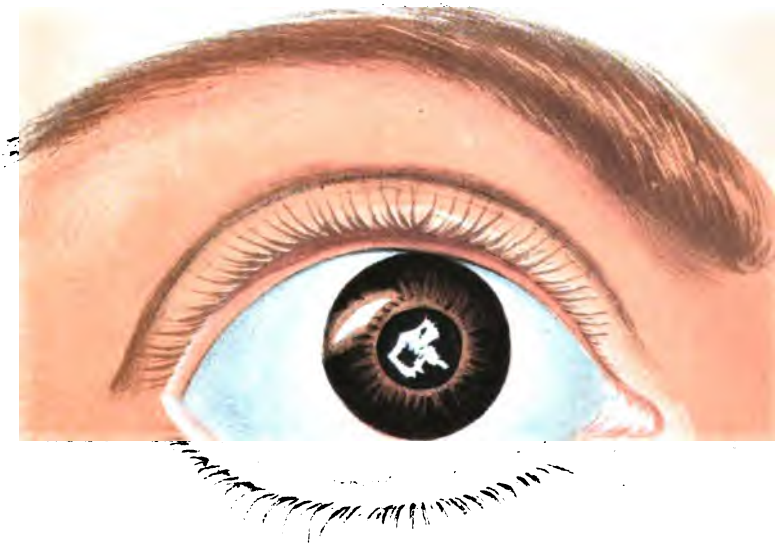

REPORT

ON THE

MEDICAL JURISPRUDENCE OF INSANITY.

BY

C. B. COVENTRY, M. D.,
UTICA, N. Y.

REPORT ON MEDICAL JURISPRUDENCE OF INSANITY.

PRELIMINARY REMARKS.—The subject of insanity, in all its relations, is one of the most interesting that can engage the attention of the physician, the philanthropist, or the medical jurist; and one of the most brilliant achievements of the medical profession in modern times, is the reform which it has effected in the cure and treatment of that unfortunate class of our fellow-beings, who are afflicted with insanity; in rescuing them not merely from the neglect, but from the cruelty and abuse which they were formerly made to suffer. The name of Pinel, who was the first to remove the chains and shackles from the insane, should be ranked with that of Harvey and Jenner, prominent among the benefactors of mankind.

Thanks to the philanthropic exertions of Pinel, Esquirol, Haslam, Conolly, Prichard, Combe, and others in Europe; of Rush, Woodward, Brigham, Ray, McDonnel, Earle, and others in this country; insanity is no longer considered by the educated, a mysterious infliction of Divine Providence, but as a symptom of disease, demanding all the care, kindness, and attention of any other form of disease.

Reforms of every kind are slow in their progress; and although much has been accomplished as regards our knowledge of the causes, pathology and proper treatment of insanity, much as regards the care and well-being of this unfortunate class of patients, it is only necessary to examine the records of our courts, the conflicting opinions advanced by judicial authority, and the verdicts often given, to see that the legal relations of insanity, and the responsibility for supposed crime are as uncertain and unsettled as in the time of Blackstone or Lord Coke. In the general community, the idea of insanity has been formed from the few cases the individual may have seen of raving maniacs, or from reading the works of Shakspeare, Scott, and other writers of this class, which, however

correct as to certain forms of insanity, give no idea of the different phases of this protean malady. These erroneous views, unfortunately, are not confined to the ignorant and illiterate. If we look at the comments and observations often found in newspapers, and, I am sorry to add, sometimes in our medical journals—where a better knowledge would be expected—or at the testimony sometimes given by medical men in courts of justice, we must be satisfied that the general intelligence on the subject of insanity is far from keeping pace with the few who have devoted particular attention to the subject. Whilst some of our judges and jurists have manifested a degree of intelligence and judgment alike creditable to themselves and the courts over which they preside, it must be admitted, that, in a large proportion of cases, the verdict is dictated more by popular influence, or prejudice, or by the talent and ingenuity of counsel, than by the stern dictates of justice. Whilst, on the one hand, some persons who were really guilty have been acquitted, on the plea of insanity; on the other, popular clamor has condemned to an ignominious death many an innocent victim of disease, who was deserving of our pity and commiseration for his misfortune, and who should have found in the courts of justice, protection from popular excitement, instead of vindictive punishment. I have seen weeks spent in the trial of a poor demented being, who seemed totally unconscious of what was going on, and who scarcely had the intelligence of a dog. One witness testified that he believed he had the intelligence of an ordinary child of five years, but was not insane. On such testimony the prisoner was convicted of murder, but died in prison. A *post-mortem* examination revealed extensive disease of the brain. In another case, the prisoner, scarcely more intelligent, was convicted of murder, and hung. In a third case, the prisoner was convicted of murder, but the judge, instead of sentencing him, sent him to the asylum, where he still remains hopelessly insane.

In all civilized countries, from the earliest ages to the present day, persons laboring under insanity have been considered irresponsible agents. They were deprived of the control of their property, confined in their person, and if any civil act was performed it was invalid, and for criminal acts they were not held responsible. The theory of the English and American law is that punishment is not inflicted as an act of vengeance or retaliation, but to prevent its repetition by the individual, and to deter others by the example. Milder and more humane modes than that of punishment can be

adopted to prevent a repetition of the crime. No good could be produced by the punishment of an unfortunate victim of insanity, who is not himself a free agent. The theory is no doubt correct, and the principle inculcated is the dictate of humanity and justice. In extreme cases there can be no difficulty in its application; but such are not usually the subject of judicial investigation, it is in doubtful cases, whether the individual is insane or not.

Many attempts have been made to draw the line of demarcation between sanity and insanity. When we can define the line which separates light from darkness, or sickness from health, we may hope—and not till then—to point out the line which separates sanity and insanity. Much of the difficulty arises from the misapplication of the term insanity. The law says: "No act done in a state of insanity can be punished as an offence."[1] If this was carried out strictly, no person who was at all insane could be punished; but no court of justice ever has, or ever should, so carry out the law.

Many insane persons are justly held as responsible for their acts as those who are sane. This gives rise to an apparent diversity of opinion, not only between the medical witnesses and the court, but between different witnesses. The question to the medical witness is not as to the responsibility of the prisoner, but as to his sanity or insanity. One answers as he is bound to do according to the strict meaning of the term. Another, however, considers the question to be whether he is so insane as not to be responsible for his actions. It is believed that, where a man's judgment is impaired, his feelings perverted, or his perception blunted from disease or injury of the brain, he is insane, and that the true question is, whether he is so insane as to be responsible for his acts, and of this each case must be judged by itself. No single principle—as a knowledge of right or wrong, of the presence or absence of delusion; or of resistless uncontrollable impulse—can be adopted as applicable to all cases.

Much of the confusion and difficulty in the jurisprudence of insanity has arisen from the attempt to judge different forms of insanity by a single standard. Thus, in idiocy and imbecility, the true question for the jury to decide is the amount of capacity of the individual; in other words, does he know right from wrong? Take, on the other hand, a case of acute mania, with delusion; here every one can see that the question of a knowledge of right and wrong is

[1] Revised Statutes of New York.

entirely irrelevant. The true question for the jury is, whether the delusion actually exists, and whether it was the cause of the act in question. Again, take a case where the prisoner professes to have been impelled by an impulse which he could not control. The prisoner admits that it was wrong; that he knew it was wrong; there is no pretence of delusion; the question then for the jury to determine is, whether the circumstances are such as to satisfy the jury that he was not a free agent.

If we examine the record of the jurisprudence of insanity, and the judicial decisions under them, we shall find much diversity of opinion as to what amount of insanity should excuse from punishment. Some, with Justice Story, contend that there should be a total deprivation of sense and reason, so that he should not know his own name, who his parents were, or able to count five. It is hardly necessary to say, that no court or jury would try such a person at the present day. The generally received doctrine is that of a knowledge of right and wrong; and such was the answer of the fifteen judges of England. The former Supreme Court of New York (Justice Beardsley) decided that the true test was a knowledge of right and wrong as applied to the particular act under consideration. Lord Erskine, with much apparent plausibility, contended, in the case of Hatfield, that the presence or absence of delusion was the true test. An intelligent jury, however, usually judges from the particular circumstances of the case, without much regard to general tests; thus, McNaughton was acquitted in England, in direct violation of the principle laid down by the fifteen judges. In a recent trial for homicide, in this country, the court instructed the jury: "In order to justify a verdict of acquittal on this ground (insanity), you must find that the defendant, although conscious of the act he was about to perpetrate, and its consequences, yet, governed by an uncontrollable impulse, his will no longer in subjection to his reason, owing to the excited and continued impetuosity of his thoughts; the confused condition of mind, enfeebled by disease and goaded by a sense of grievous wrongs; that he was wrought up to a frenzy bordering on madness, which rendered him unable to control his actions or direct his movements."[1] The prisoner was acquitted.

Although the work of Dr. Rush on the Mind, published in 1812, which was far in advance of the time at which he wrote, contains

[1] Trial of Smith for the killing of Carter. Philadelphia, 1858.

many valuable suggestions on the jurisprudence of insanity, as also the tract of Haslam, republished in this country by Cooper in 1819, and the works on insanity by Pinel, Esquirol, Prichard, and Combe, yet we had no systematic work on the subject, either in England or this country, until the publication of the valuable work of Dr. Ray, on the *Medical Jurisprudence of Insanity*, first published in 1838. If this valuable work was in the hands of every medical witness and medical jurist, it would tend to dispel much of the mystery and confusion which surround the subject.

Since the publication of Dr. Ray, we have had a new edition, with additions, of the same work; several valuable contributions published in the *Journal of Insanity*, an able article, with copious notes by Prof. C. A. Lee, M.D., in Guy's *Medical Jurisprudence*; and a very elaborate article on the same subject, in the recent publication of Wharton and Stillé, on Medical Jurisprudence.

PATHOLOGY OF INSANITY.

In our investigation of this subject, we are met at the threshold by the question of what is Insanity. Almost all modern writers agree that it is impossible to give a clear and intelligent description, in a concise definition. Dr. Andrew Combe defines it as "a prolonged departure from the accustomed mode of thinking or acting, of the individual, without any adequate cause." Although this conveys a clear idea of one of the important evidences of insanity, it only applies to one form, viz., mania, and gives no idea of the actual pathology. Dr. Bucknill says: "Insanity, therefore, may be defined as a condition of the mind in which a false action of conception or judgment, or defective power of the will, or an uncontrollable violence of the emotions and instincts have separately or conjointly been produced by disease."

We know nothing of the manner in which moral emotions or passions affect the physical organization, or the connection of mind and matter; and it is not probable that we ever shall. We know just as little why the eye alone is impressed with the rays of light, giving us vision, and the ear with aerial vibration, giving us the sense of sound. This, however, does not prevent our studying the laws of optics, or those of acoustics. The laws which govern the functions of the brain, as the instrument of mental manifestation, are just as certain as those of vision or hearing.

We know that the brain is subject to the same laws of nutrition, growth, and decay, as other parts of the system; that it requires a constant supply of healthy blood for its nourishment; that every thought or emotion of the mind, every passion and feeling, is attended with disintegration of the cerebral mass. It is exhausted by long-continued exertion, and refreshed by rest; strengthened by systematic and continued exercise, and weakened by want of exercise. It is not, then, difficult to see that a great variety of circumstances may derange the function of the brain. A deficient supply of blood; too much blood, producing congestion; blood of an impure or poisonous character, may all interfere with the proper function of the cerebrum. So a defective organization or development of the brain itself may destroy or impair its powers. As natural healthy function of brain is necessary for sanity, a departure from any of those conditions may produce insanity. When we know that a small portion of a poisonous substance introduced into the circulation, a slight injury of the head, a deficient quantity or an excess of blood sent to the brain, may any of them produce insanity, it would seem unnecessary to seek for causes in the immaterial agent of which we can know nothing, except as it is manifested through the material organ, or instrument, the brain.

We may investigate the conditions and laws which govern the function of the brain. Without attempting to solve the great mystery which surrounds the connection of mind and matter, Dr. Brigham says: "We consider insanity a chronic disease of the brain, producing either derangement of the intellectual faculties, or a prolonged change of the feelings, affections, and habits, of an individual. In all cases, it is a disease of the brain, though the disease of this organ may be secondary, and the consequence of primary disease of the stomach, liver, or some other part of the body; or it may arise from too great exertion of the mental powers or feelings; but still insanity never results, unless the brain itself becomes affected."[1] Webster defines insanity as "derangement of the intellect." This is too limited, as there may be derangement of the feelings, passions, and emotions, with little or no derangement of intellect; it is, however, considered synonymous with derangement. It would therefore be more appropriate to say that insanity was a symptom or evidence of deranged function of the brain.

[1] American Journal of Insanity, for Oct. 1844.

Most writers include idiocy and imbecility under the general head of insanity, as these arise from congenital deformity, or imperfect development of the brain. Perhaps they could not properly be said to be caused by disease. We may thus define insanity *as defective or deranged mental manifestations, arising from defective organization, imperfect development or diseased action of the whole, or part of the brain.* Dr. Brigham says: "The brain may be diseased, without causing insanity; for, although we say, and say truly, that the brain is the organ of the mind, yet certain portions of the brain are not concerned in the manifestations of mental powers, but have other duties to perform. Certain parts of the brain confer on us the power of voluntary motion; but these portions are distinct from those connected with the mental faculties. Hence, we sometimes see—though rarely, I admit—individuals paralytic, and unable to move from disease of the brain, whose minds are not at all, or but very little, disturbed." "Insanity, in most cases, is the consequence of very slight disease of a small part of the brain. If it were not so, the disease would soon terminate in death."[1]

The remote causes of insanity are the same as may produce disease in other organs; but, in addition, there are some which are peculiar to this affection, as violent mental shocks, or emotions. Dr. Brigham mentions the case of a patient in the asylum who became insane from the loss of a son. A similar case is now under charge of the writer. On one occasion, when attending church, the subject of this case saw a young man whom she fancied was her dead son, and insisted on going to him. When apprised by himself of her mistake, she still insisted it was her lost son.

In most cases of protracted insanity some traces of disease are found on a *post-mortem* examination. It is more than probable that the morbid appearance is the result, and not the cause of deranged function; and its absence is no argument against the idea of insanity being caused by deranged action.

It is evident, from the preceding remarks, that insanity is often but an effect of a slight injury or disease of a part of the brain; and in many cases only a few of the faculties of the mind are disordered. From this, we infer that the brain is not a single organ, but a congeries of organs, as maintained by Gall and his celebrated successors Spurzheim and Combe. Thus, each mental faculty may be disordered by disease of the brain, while others are not affected; a

[1] Journal of Insanity for Oct. 1844, p. 100.

fact every day observed in lunatic asylums, but which we know not how to explain if we believe the brain to be a single organ. We very rarely find the whole mind destroyed or disordered in insanity, except in cases of long continuance, or of unusual severity. A majority of patients in lunatic asylums have considerable mind left undisturbed, and some of them conduct themselves with propriety and converse rationally most of the time, and on all but a few subjects. "We wish to repeat that there is no faculty of the mind but may become deranged by disease of the brain. Disease of one part of this organ may cause the derangement of some of the intellectual faculties, while disease in another part may not disturb the intellect, but derange the moral powers or propensities. Thus, we see blows on the head and wounds of the brain sometimes destroy only one or two of the intellectual faculties, such as a memory of words, or the memory of places, and at other times to effect an entire change in the moral character."[1]

The analogy of the organs of sense, the result of pathology, and the phenomena of insanity and dreaming, all go to prove that the mind is not manifested through the agency of a single organ, but of many separate organs intimately connected, to a certain extent mutually dependent on each other, closely in contact, drawing their nourishment from the same fountain, consequently influenced and affected by the same causes, but still capable of acting to a certain extent, independent of each other, and of being separately injured or diseased.

CLASSIFICATION OF INSANITY.

The term insanity, or derangement, has been preferred to that of unsound mind, used by some writers. The common law of England formerly recognized but two classes of insane, viz., Idiots and Lunatics. Blackstone says: "An idiot, or natural fool, is one that has no understanding from his nativity, and therefore is presumed as never likely to have any." "A lunatic, or non-compos, is one who has had understanding, but by disease, grief, or other accident, has lost the use of his reason." Cases, however, soon occurred which could not be properly embraced in either of these divisions; and the term *unsound mind* was adopted, and intended

[1] Journal of Insanity, by Doct. Brigham.

to embrace all the different forms of insanity. Medical jurists have most usually adopted the divisions of Esquirol, viz., Mania, Monomania, Dementia, and Idiocy; a great variety of classifications have been adopted by different writers. I have preferred that adopted by Dr. Guy, in his work on Medical Jurisprudence, and which resembles very nearly that of Ray. Though open to objection, it is believed to approach as nearly to the present condition of our knowledge as any we could adopt. It will be seen that the term *unsound mind* is such as embraces all the different forms of insanity:—

Unsound Mind.	From defective development, or diminished activity of the functions.	Congenital, or occurring in childhood.	Amentia.	1. Idiocy, including cretinism. 2. Imbecility.
		Occurring subsequent to the development of the functions.	Dementia.	1. Consequent on mania, mental shocks, or injuries of the brain. 2. Senile.
	From undue excitement.		Mania.	1. General. 2. Intellectual. — *a.* General. *b.* Partial. 3. Moral. — *a.* General. *b.* Partial.

The principal objection to the above arrangement is that we occasionally meet with cases, especially those resulting from onanism or undue sexual intercourse, which do not seem properly to come under any of the above divisions.

It will be seen, by referring to the table, that the different forms of insanity are divided into two great divisions:—

First. Where there is a defect of capacity, or energy, or prostration of the mental powers.—Amentia: embracing idiocy, imbecility, and dementia.

Second. Mania: Intellectual and moral, divided into general and partial.

I. Amentia.—*Idiocy.* An idiot is defined as one "of non-sane memory *à nativitata*," as one who from his nativity, by a perpetual infirmity, is *non compos mentis;* or as one who has no understanding from his nativity. Dr. Ray says: "Idiocy is that condition of the mind in which the reflective, and a part or all the affective powers, are either entirely wanting, or are manifested in the slightest possible extent." In the worst cases of idiotism, there is usually more

or less malformation of the head, either very small or preternaturally large; often deformity in other parts of the body, feebleness of the muscular system, generally more or less defect of the senses: Whilst the intellectual and moral faculties are almost null, not from any perversions, but from defective organization, or defective development of the brain.

The individuals are often deaf and dumb; sight, and taste, and smell are imperfect. In the worst forms, life seems merely vegetative, and they manifest less of intelligence than the brute creation. Some idiots, however, manifest a certain degree of intelligence. They are able to recognize those who supply them with food; indicate their desires by certain cries and gestures; manifest a sense of pleasure and pain. In other cases, they have a certain degree of mechanical ingenuity. The fact that an individual has one or two faculties does not remove him from the class of idiots. On the other hand, we find individuals of great and highly cultivated talents, and yet a single faculty may be idiotic; but this does not make them idiots. Mr. George Combe tells us that this is the case with himself in regard to numbers. We often find it true in regard to music, and occasionally in regard to colors.

In regard to the legal relations of idiocy, in its more perfect forms, there can be no question. An idiot is not competent to perform any civil contract, and is not responsible for any crime he may commit. In the less perfect forms, it will depend on the degree of intelligence which they manifest; and this is a question which must be submitted to the jury.

Imbecility.—Imbecility is used to designate those forms of insanity or unsound mind which arise, not from an original malformation or defective organization, as in idiocy, but from some disease occurring in childhood and preventing the perfect development of the brain. Though of not much practical importance, yet the distinction is of value, inasmuch as in the latter case there has already been some manifestation of mind, and consequently the absence of sense and reason is seldom so perfect as in the former. Imbecility is defined by Dr. Ray as "an abnormal deficiency either in those faculties that acquaint us with the qualities and ordinary relation of things, or in those which furnish us with the moral motives that regulate our relations and conduct towards our fellow-men." Although imbecility is most frequently caused by disease occurring in childhood, many writers give it a more extended signification, as follows:—

1. Where original weakness or imbecility has lapsed into unsoundness of mind.

2. Imbecility supervening upon some disease of the brain, and manifesting itself particularly in a loss of memory.

3. Imbecility with confusion of ideas as of mind, and often attended with a loss of memory. It is either primary, or secondary; and in the former may be consequent upon severe disease of the brain, epilepsy, intemperance, sexual excesses, onanism, and senility. In the second form, it may arise from previous mania, or other forms of unsound mind, and always excludes the idea of responsibility.

4. Imbecility remaining after the patient has recovered from an attack of insanity, as in other cases, the organ affected remains more or less enfeebled after an attack of disease, so that in most, if not in all cases of recovery from insanity, a certain degree of imbecility remains for a time, but does not excuse the responsibility of the agent. In point of capacity, imbeciles differ as much as persons in ordinary life. Whilst some approach in all external characteristics, the class of idiots, others, without a careful examination, would pass for persons of ordinary or average capacity. Some will even manifest a high degree of capacity on some subjects, but total deficiency on others. Professor Lee, in his Notes to Guy's *Medical Jurisprudence*, says: "We know an individual now in the fiftieth year of his age, who from an attack of disease when an infant has never been able to read or write, or to make the simplest calculation in figures, or to know one letter from another, or to have any notions of cleanliness; and yet he possesses an excellent memory, and can repeat the contents of Webster's Spelling Book and the New Testament from beginning to end, from having heard them read in school, and can spell as well as most children of ten years old." There is in the asylum at Utica, a gentleman who has been there since its first organization, who had an attack of acute mania, whilst attending medical lectures in 1828; he now converses intelligently on most subjects, writes with considerable ability, and, being fond of declamation, speaks with much force and eloquence, and yet has so little foresight or precaution—as I was informed by a former superintendent—that he would wander all day without taking a thought where he was to sleep or get the next meal.

Every person conversant with the subject will recognize the truthfulness of the following description by Georget: "In hospitals

for the insane, there is always a certain number of imbeciles who do the coarser work of the house, or serve as domestics or assistants to the regular officers. They become sufficiently intelligent to perform their duties well, to sweep the courts, carry burdens, move machines, execute simple commissions, know the use of money, and procure various enjoyments; but they have no idea, or a very imperfect one, of society, laws, morality, courts, and trials; and though they may have some idea of property, they have no conception of the consequence of theft. They may have been taught to refrain from injuring others, but are ignorant of what would be done to them if guilty of incendiarism or murder. Indeed, it is well known how common theft is among imbeciles and idiots, and for very obvious reasons. Some of them have no conception of property, nor of the distinction of *meum* and *tuum*. Their conduct is actuated solely by the fear of punishment, when capable of experiencing this sentiment, and by their own desires. Others have some notions of property, but neither a sense of morality nor a fear of punishment furnishes motives sufficiently powerful to prevent them from stealing. The sentiment of cunning, too, may be very much developed while the other faculties are more or less deficient. Among the lower orders of society are many imbeciles a little more intelligent than these, and not considered as utterly devoid of understanding, who nevertheless have but vague and imperfect notions of social duties and of justice. They engage in occupations that require no great extent of intellect, and even in the simplest of the mechanic arts. If they do not pass among their acquaintances as imbeciles, they are at least regarded as singular beings with feeble understanding, and are teased and tormented in innumerable ways. Many of them, for want of some powerfully restraining motive, indulge in drinking and become lazy, drunken, and dissipated, and finally fall into the hands of justice in a greater number than is generally suspected. They steal adroitly, and hence are considered very intelligent; they recommence their offences the moment they are relieved from confinement, and are thus believed to be obstinately perverse; they are violent and passionate, and the slightest motive is sufficient to plunge them into deeds of incendiarism and murder. Those who have strong sexual propensities soon become guilty of outrages on female chastity. These beings of limited capacity furnish to the courts of justice, to prisons, and scaffolds, more subjects than is generally supposed."

We find in the community many persons who, though they do

not pass for imbeciles, and have a due sense of right and wrong, and sufficient moral sense to prevent them from violating the laws, have not sufficient capacity to acquire property or to retain it if they inherit it. They are the prey of sharpers and swindlers if they have property, and the hewers of wood and drawers of water to the more intelligent if they have not.

In regard to the legal relations of imbecility, no fixed rule can be laid down, if it is simple imbecility, unconnected with derangement. Whether the question is one of civil capacity or criminal responsibility, it is a question of capacity which must be submitted to the jury to decide. The witness, when called upon to testify in a case of imbecility, whether it has reference to his responsibility for crime, or the propriety of depriving him of the control of his property or restraining him of his liberty, must not judge from any single isolated act, but from the whole history of the individual, the opportunity he may have had for improvement, the moral influence exerted over him, and the capacity which he may have manifested for the transaction of business; and if it is a criminal act, whether there is any evidence of its being connected with delusion.

Dementia.—We should distinguish this form of insanity from the two preceding. We have seen that in idiocy it was congenital, in imbecility it occurred mostly in early life, and before the faculties were fully developed; whilst dementia only occurs after the full development of the faculties, and mostly in old age. Dementia differs from mania, on the other hand, from the circumstance that the latter is attended with excitement, and an exalted condition of the faculties, whilst the other is debility produced by exhaustion.

Dementia manifests itself under three different forms, which differ somewhat in their characteristics: 1. Dementia, resulting from some mental shock. 2. Dementia, from previous disease of the brain, as mania, delirium, inflammation of the brain or from delirium tremens. 3. Senile dementia, resulting from old age.

1. Dementia resulting from some mental shock. Many cases of this kind are related where, from some sudden fright, or unexpected noises, the mental process seems suddenly arrested and remains stationary. Thus, a case is related of a fisherman, who went in a boat to meet his bride; but the boat was upset, and she was lost. He became deranged from the shock, and would sit for days in the corner moving his arms as if rowing a boat. Sometimes, they will stand for many hours in the same position without moving, or speaking, with a vacant stare entirely void of intelligence; some-

times entirely silent, at others muttering to themselves some unintelligible jargon. In such cases, the insanity comes on suddenly, and from some known cause.

2. In the second form, the character of the dementia does not differ materially from the former, but the manner of approach is different. The natural termination of mania is either in recovery or dementia. Dr. Ray says that dementia cannot easily be mistaken for mania: this is true; but there is a certain period in the gradual change of one into the other, when it would be difficult to say to which class the case belongs. In a trial which excited much interest, the prisoner was clearly demented, and several intelligent medical witnesses so testified; but the prisoner, at the time the homicide was committed, manifested a degree of intelligence and cunning inconsistent with dementia. Although the cause of this was plain enough to the witnesses, it seemed incomprehensible to the jury. Before his death, which occurred some time after, he became perfectly demented, and a *post-mortem* examination revealed extensive disease of the brain. When it results from injury, or from inflammation, the mind seems arrested in its course. Dr. Beck mentions the case of a young clergyman who received an injury of the head; for a time his life was despaired of; but at length his health was restored, but his mind was destroyed. At the time of the injury, he was on the point of being married. Though he lived to an advanced age, he ever afterwards imagined himself on the point of marriage.

3. In senile dementia, the disease comes on gradually; the memory of recent events is first to be affected. The reasoning faculties frequently retain their vigor, after the memory is impaired. The moral and affective faculties often maintain their vigor, even when the intellect is lost. The intellectual faculties gradually fail, and the individual is reduced to a state of utter helplessness and dependence.

In cases of dementia, therefore, there may be every possible shade of mental affection between the excitement of mania, the glimmering of sense and reason, and the perfect extinction of all the mental faculties.

Legal Relations of Dementia.—It is seldom that dementia becomes a subject of judicial investigation, except as regards the validity of a will. It is not often that criminal acts are committed by the demented. In the more perfect form, they are totally incapable of any civil contract, and irresponsible for any criminal act. It is in

these cases where, from advancing age, the memory begins to fail, the intellect to become dull, that the question arises as to the capacity of the party to make a will. It is a principle well established that, where the instrument itself is consistent and reasonable; where it is in accordance with the previously expressed intention; and where there is no evidence that undue or improper influence had been used, and especially if the witnesses to the will testify that at the time of its execution he seemed to comprehend its import, it will usually be sustained, though it may be proved that the memory was somewhat impaired. On the other hand, if there is reason to suppose improper influences had been used, the courts are very apt to set it aside.

II. MANIA.—Under this head are included all those forms of insanity which are characterized by undue excitement of the faculties. It differs, therefore, from the others by the symptoms which characterize it, and the legal tests by which it is known. Whilst, in idiocy, imbecility, and dementia, the former test of a knowledge of right and wrong might for the most part be properly applied, it would be entirely inapplicable when applied to mania, where the individual often manifests a degree of sagacity and cunning, of which he was hardly considered capable when sane.

We have seen that, according to the arrangement adopted, mania was divided into General, Intellectual, and Moral; and the two latter into the subdivisions General and Partial.

1. *General Mania.*—In this form of disease, both the intellect and the passions and feelings are thrown into a state of excitement and confusion. A rapid succession of unconnected ideas or emotions, acts of extravagance, a more or less complete forgetfulness of the previous condition, diminished sensibility to external impressions, loss or abolition of the faculty of judgment, characterize this form of insanity. Under whatever forms it may appear, unless it is the immediate effect of injuries, moral shocks, or acute disease, it is usually presented by what has been termed a period of incubation. The period of incubation varies from a few hours to months, and even years, and it is not a very rare occurrence that an individual, after having been for a long time on the very verge of madness, gradually recovers without any outburst. In most cases, where the attack is not sudden, there is a struggle on the part of the patient to conceal his emotions; he is perfectly conscious how they would be viewed by others, although they may themselves believe

in their reality. The patient feels that there is a change in his feelings, but tries to conceal it; he is unable to sleep at night; his appetite is impaired; he suffers from constipation; becomes thin and sallow. As these changes are gradually taking place, the whole character of the man is changed; the industrious, orderly, business man becomes idle, negligent, and careless; the fond husband and affectionate parent becomes cross, morose, and tyrannical. If he was before prudent and economical, he becomes careless and extravagant; not unfrequently enters into politics or religion with a zeal altogether foreign to his former character; but if, on the other hand, he was before religious, he often becomes very negligent of his religious duties, and sometimes profane. The great and important evidence of his insanity is not so much that his thoughts and actions differ from those of others, as from his former self. It is supposed that the conduct and character of an individual do not undergo a material change, without some adequate cause. If, then, such changes take place without any assignable cause, and are attended with the other indications of insanity, or deranged health, impaired appetite, and inability to sleep, there can be but little doubt the individual is on the brink of insanity, though there has been no decided outbreak of the disease. The period of incubation is very various; but, when the insanity is fully formed, the senses, the intellect, and the moral feelings and purposes are thrown into one complete state of chaos and confusion.

2. *Intellectual Mania.*—In some cases, insanity seems almost entirely confined to the intellect, without influencing the feelings. It more frequently occurs in those distinguished for their ability. A gentleman, who was for a long time an inmate of the New York State Asylum, was a striking illustration of this form. When young, he studied law, and entered upon the practice of his profession, with the reputation of talents and great promise. After he became insane, in his diary was found his arrangement of time, by which he devoted a certain number of hours to study, a limited time for meals and exercise, and but a short period to sleep. The peculiar feature of his insanity was that he boasted of what he had done, and what he meant to do; was very polite, and seldom troublesome, unless when he resented what he considered an insult to his dignity, or a want of due respect from inferiors. Articles written by him for the Journal, always carried with them the evidence of insanity, and yet they often abounded with the evidence of general intelligence, great shrewdness, and high and lofty senti-

ment. I could never discover that his high sense of honor his love of virtue, or his attachment to his friends was in the least affected. I had known him before his insanity, and wherever I met him, however much deranged he might be, he always expressed his pleasure and gratification at the meeting, and seldom failed to speak of incidents and circumstances which occurred before he became insane.

2. *Partial Intellectual Mania.*—This constitutes the form of insanity described by the older writers under the name of Melancholy, and for which Esquirol substituted that of Monomania. It was termed melancholy, from the supposition that it was attended by despondency and depression of spirits; but this is far from being always the case. The most simple form of this affection is where the patient labors under a fixed delusion as to one particular circumstance or event. It is beautifully illustrated in the character of the astronomer, in Dr. Johnson's inimitable tale of Rasselas. Sir George Mackenzie says: "I knew one who seemed a discreet person, and could converse most pertinently, until they spoke of the moon; but, upon hearing this mentioned, fell instantly a staring, and into great extravagancies, believing himself to be secretary to the moon." Lord Erskine, in his defence of Hadfield, mentions two memorable instances of this form of insanity, in one of which he was witness, and the other he received from Lord Mansfield. He says: "I examined for the greater part of a day, in this very place, an unfortunate gentleman who had indicted a most affectionate brother, together with the keeper of a madhouse at Hoxton, for having imprisoned him as a lunatic, whilst, according to his evidence, he was in his perfect senses. I was unfortunately not instructed in what his lunacy consisted. The day was wasted, and the prosecutor appeared to the judge and jury and a humane English audience as the victim of a most barbarous and wanton oppression, when Dr. Sims came into court. From Dr. S., I learned that the very man whom I had been upwards of an hour examining, believed himself to be the *Lord and Saviour of mankind.* I then affected to lament the indecency of my ignorant examination, when he expressed his forgiveness, and said, with the utmost gravity and emphasis, 'I am the Christ.' In the other case, a man by the name of Wood had indicted Dr. Monroe for keeping him a prisoner. He underwent a most severe examination, without exposing his complaint, when Dr. Battye requested me to ask him what had become of the princess, whom he corresponded with in cherry

juice. He answered that there was nothing at all in that, because having been (as every body knew) imprisoned in a high tower, and being debarred the use of ink, he had no other means of correspondence but by writing his letters in cherry juice, and throwing them into the river which surrounded the tower, where the princess received them in a boat. Of course there was no tower, no imprisonment, no writing in cherry juice, no river, no boat, but the whole an inveterate phantom of a morbid imagination. I immediately," continued Lord Mansfield, "directed Dr. Monroe to be acquitted. But this man, Wood, on his way to the madhouse, indicted Dr. Monroe over again for trespass and imprisonment in London. On the second trial, all the ingenuity of the bar, and all the authority of the court, could not make him say a single syllable upon the topic which had put an end to the indictment before." One of the most frequent cases of this form of insanity is where the patients imagine there is some living animal within them. With females, they often imagine and insist that they are pregnant. On one occasion, a man insisted he had mice in his abdomen; his physician gave him something, as he said, to destroy them; but the patient soon returned very much alarmed, and wanted to know if he had given him ratsbane.

3. *Moral Mania.*—As we have already seen, previous to the time of Pinel, insanity was considered almost, if not entirely, an affection of the intellect, or of the reasoning faculties; but, whilst connected with the Bicêtre, he found many maniacs who betrayed no lesion of the understanding, but were under the dominion of abstract and instinctive fury, as if the affective faculties alone had sustained injury. This he designated as "*mania sans delire.*" Since his time, the great importance of this distinction has been recognized by a large number of writers on insanity; though not generally recognized by the courts of justice, and apparently questioned by some recent writers on the subject. That the moral feelings, the affections and sentiments, the love of family and friends, the love of justice, and the feelings of veneration and of conscientiousness may be destroyed or perverted by the same means—*i. e.*, disease of the brain—as the intellectual or reasoning faculties, is established by too much evidence to admit of a question. It is, however, true that the same causes which produce moral insanity, are apt also to affect the intellect, and that in general mania, the first indication is a perversion of the moral faculties, and that moral insanity can hardly continue long without affecting the intellect.

At the same time, if we admit the term insanity, as applied to these perversions of the feelings, it is a very difficult question to determine how far it should excuse the commission of crime. Although the feelings, the inclinations, and propensities may have changed, yet so long as the individual is able to control his actions, and possesses sufficient intelligence to know the consequences of his actions, and is not laboring under any delusion, it is difficult to say how far he should be excused. The following is one of the most striking cases of moral insanity I have ever seen.

Some years since, the late Prof. James Webster called upon me, saying he had with him a gentleman whom he was requested to place in the asylum, but that he was wholly at a loss what to do. The gentleman, who was a resident of one of the western villages in New York, had left home without the knowledge of his family and friends. Some time after, they heard of him in one of the Atlantic cities. Dr. W. was requested to go for him, and leave him at the asylum at Utica. It appeared that, for some time before his leaving home, his friends and family had noticed a marked change in his conduct. From being an industrious and careful business man, he had become idle and careless in his affairs; from a kind and affectionate husband, and indulgent parent, he had become cross, tyrannical, and abusive in his family. These changes had given rise to a report that he might be insane—a report which he was particularly anxious to rebut. Dr. W. found him boarding at a fashionable and expensive hotel. He had introduced himself to the public authorities, had visited the different public institutions, and manifested a warm interest in the charitable institutions of the city. When the Dr. mentioned the object of his visit to one of the officers of the city, they begged that he would say nothing about it publicly, as no one had suspected him of being insane. In order to get him to leave, he requested the landlord to insist on payment for his board. Knowing that he had no money, by this means he got his consent to leave and travel with him, and, after visiting several other places, they came to Utica. My advice was that he should not place him in the asylum, but take him home, and if it became necessary, to tell him frankly why they placed him in confinement. At the same time, I proposed to the Dr. and the patient to visit the asylum, and went with them; the patient consulted Dr. Brigham, the superintendent, in regard to his health; mentioned the reports as to his insanity, and showed him several articles which he had written for different papers on a variety of subjects, for the

purpose of proving he could not be insane. In the course of conversation, I suggested that it was very difficult for a patient to judge in his own case. He replied that he knew that, and therefore went among strangers, where they had not heard the reports to his prejudice; and if they did not discover any insanity, he thought it pretty good evidence that he was not crazy. He was taken home, and not long after brought back to the asylum. Unfortunately, instead of telling him it was necessary, and, if he refused, compelling him to come, they represented that it was in vain for him to attempt to satisfy the community on the subject; but, if he would consent to go and board at the asylum a few weeks, and get a certificate from the superintendent and his assistants that he was not insane, it would satisfy his friends and the public. On these conditions he consented to go. When the few weeks were up, he wanted the certificates. Of course they could not be given. He then demanded to be released; this could not be granted, at which he was very indignant. Dr. Brigham, the superintendent, said he was the most troublesome patient he ever had in the asylum. Too rational and intelligent to place in close confinement, there was nothing that cunning and sagacity could devise that he did not resort to, to annoy the officers and attendants. On one occasion, he wished to see the managers privately. When brought before them, and they wished to know what complaints he had to make, he said it was not his business to make complaints, but it was their business —as managers of the institution—to know how it was controlled; that it was a very responsible office; and that he doubted very much whether they knew anything about what was going on. It was a regulation of the asylum that the chairs should not be taken from the parlors into the hall; this had been done several times, and the chairs quietly returned by the attendant. On one of his visits, the superintendent found him, with several other patients, on the floor. On inquiring what it meant, he said the attendant would not let him have a chair, though there were plenty of such in the hall. Every opportunity he could get he importuned his wife and family to take him out. At length his wife, worn out by his importunities, came to me to know what she had better do. I was aware that they would be very glad to get rid of him at the asylum, and my advice was to take him home, and if it became necessary to confine him, to take him to some other institution, to tell him why they did it, and not leave the impression that he was confined by the officers of the asylum.

Partial Moral Mania.—This consists in the exaltation or predominance of one passion or propensity over every other. The propensity thus affected, propels the individual, as it were, by a kind of irresistible impulse. Sometimes the individual seems to retain a full consciousness of the impropriety of the conduct, and even struggles to resist it, and in many instances patients have requested to be confined to prevent their committing some outrage.

Dr. Woodward, in one of his reports, mentions an interesting case of the kind. He was consulted by a young man, who stated that he had been compelled to quit his work, from fear that he should murder his own brother, who worked in the same shop. He had no enmity or dislike to his brother, but a strong impulse to kill him. He had struggled against it; but, fearful he might not be able to restrain himself, had quit the shop and his work.

Many mothers have begged to be confined, lest they should kill their children, although in some cases they retain a full sense of the impropriety and horror of the act. I am satisfied that in many it arises from a want of any due appreciation of the criminality of the act.

There are scarcely any of the stronger impulses of our nature which may not be excited into an undue activity. Writers on this subject have, however, omitted to notice an important distinction between cases resulting from an exalted and diseased condition of the brain, and those resulting from a natural defect or incapacity of appreciating the force of moral obligation; the one is properly a case of moral mania; the other of moral idiocy.

The following are some of the principal forms of moral mania:—

(1.) *Cleptomania, or Propensity to Theft.*—Dr. Rush has noticed this particular form of mania, under the title of derangement in the will. Many cases are on record of persons whose conduct was moral and irreproachable in every other respect, but who had a strong propensity to steal—one evidence that in many cases it is an attendant on imbecility. When it occurs as a consequence of disease, in a person in whom it did not previously exist, or in connection with other evidence of insanity, it should be considered as only one of the attendants of mania. Dr. Lee, in his Notes to Guy's *Medical Jurisprudence*, mentions the case of a physician who was several times arrested for pilfering, though in every other respect his conduct was moral and correct. The peculiarity of these cases is that it seems to arise from an irresistible impulse, and not from any ulterior object, as articles which can be of no use

to the person are as often stolen as the most useful or valuable. It is only in those cases where it is attended with a change in the habits and conduct of the person, that it can properly be considered *Partial Mania;* in others, it is more properly *Partial Imbecility.*

(2.) *Lying.*—Dr. Rush says there are many instances of persons of sound understanding, and some of uncommon talents, who are afflicted with this *lying* disease in the will. It differs from exculpative, fraudulent, and malicious lying, in not being influenced by any of the motives of any of them. "Every person who has much acquaintance with society, must have known individuals of this kind. I knew a physician who had considerable natural shrewdness, and acquired an extended reputation as a practitioner, who never manifested the least conception of any moral obligation in what he said. What seemed the most surprising was, that he would relate, with all the gravity of truth, the most preposterous falsehoods, when he knew that his hearers knew that he was lying." As in the former case, it is only while this propensity supervenes from disease, that it should be considered a case of partial moral mania.

(3.) *Pyromania, or a Morbid Propensity to Incendiarism.*—This form of partial moral mania is not of very uncommon occurrence. In many, perhaps most cases, it is only one of the forms in which insanity manifests itself, and there are persons to be found in almost every asylum who have been acquitted of incendiarism. In some cases, it is almost the sole indication, and seems the result of a morbid propensity, without any marked lesion of the intellect, or other moral faculties.

There was, for many years, a young man in the asylum at Utica, who had been acquitted on the ground of insanity. He was well educated, a fine musician, and in his conversation gave no evidence of insanity. As an evidence of this, he was for some time employed as teacher of the school in the asylum; and yet the circumstances were such as to leave little or no doubt it was the work of an insane person. When an alarm of fire was given, he quietly said he guessed it was the church, for he set it on fire, and that he had burned some other buildings which had been burned. The volunteered confession, the acknowledgment of having set other buildings on fire, the absence of all motive, and apparently of all sense of criminality, would tend to show that he was not a respon-

sible agent, and had no realizing sense of the crime he had committed.

(4.) *Suicidal Mania.*—It is certainly a singular circumstance that the propensity of self-destruction is so common an attendant on mania. No person who has been familiar with the insane, and knows how difficult it often is to prevent them from committing suicide, can doubt that a large proportion of the cases, now become so frequent, of self-destruction, results from insanity. The frequency with which this is effected or attempted, is indeed the strongest argument for the early removal of patients to a well conducted asylum, where the patient can be protected from himself. This is almost, if not quite impossible, when the patient remains in his own home. Whether the commission of suicide should of itself, in all cases, be considered an evidence of insanity or not, I shall not question. Where an individual deliberately takes his own life without there being anything in his situation and circumstances to account for it; where it has been preceded by depression of spirits and despondency; where, in short, there had been a marked change in the conduct and character of the individual, we may safely attribute the rash act to insanity, though there may not have been any positive evidence of deranged intellect previous to the act. In England, suicide is considered as felony, and an attempt, if it fail, is punished by the courts, unless there is decided evidence of insanity; but it is said the evidence of insanity must be stronger than in cases of homicide. In this country, the legal bearing is principally in cases of life-insurance. In the policy of all insurance companies, there is a provision that the insurance is forfeited in case of self-destruction; but the courts have repeatedly decided that suicide by a person who is insane, is not self-destruction in the view of the law.

(5.) *Homicidal Mania.*—Of all the forms of partial moral mania, that of homicidal mania has elicited most discussion, and may be considered most important. Formerly rejected by the courts in a plea of insanity, advocated by many of the most distinguished writers, it has found its way into the courts, but has again been drawn in question by Bucknell, Wharton, Winslow, Mayo, and others. That insanity at times firsts manifests itself in this form cannot be doubted; but the writers mentioned contend that it must have previously existed, and that there should be some evidence of it in the conduct of the individual. In short, that disease of the brain could not take place so suddenly, as at once to destroy the power of self-

control, and consequently the responsibility of the individual. If we remember the sudden effect produced by some medicinal agents, as nitrous oxide, chloroform, sulphuric ether, and the loss of consciousness which they produce, we can well imagine that a sudden congestion of the brain, from whatever cause, might produce a temporary insanity. At the same time, it is no doubt true that, in a large majority of the cases of what have been considered impulsive insanity, it is only the sudden outburst of a disease which the patient had previously been able to conceal; and, if his conduct is carefully examined, it will be found that his character was changed, and that he gave decided evidence of insanity, previous to the criminal act.

TESTS OF INSANITY.

In cases of unsound mind from defective development, or diminished activity of the organs, there is not usually much difficulty in determining its existence. The only question likely to arise would be the extent of the disqualification for civil contracts, or of responsibility for criminal acts. The previous history of the individual; the education he had received; whether he had been in the habit of transacting business; and the general estimate of society, together with the capacity of receiving instruction, should all be taken into the account. It is not often that either imbecility or dementia is feigned, as the previous history of the individual would expose them. The various tests which have at different times been adopted to determine the capacity of imbeciles and persons demented, as the ability to count, to read or write, or remembering the past events of their lives, are all fallacious; and the medical witness, as well as the jury, is compelled to form his opinion from the whole history of the case.

Character of Insanity from Undue Excitement of the Faculties; Mania.—1. The maniac differs from the sane, not from a loss or defect of any of the faculties, as in idiocy and imbecility, but in excessive action in some, and in exercising them differently. To judge of the existence of mania, it is necessary to know how a man acts under ordinary circumstances. Men differ so widely from each other, that no particular standard can be adopted. It is not mere eccentricity that constitutes insanity, or that a man feels, thinks, and acts different from any other man. It must be remembered

that insanity consists in a change of character produced by disease. The standard, then, by which a man is to be judged is his former self. Thus, the same acts committed by two different individuals, might in one case be an evidence of insanity, and in the other not. This, it appears to me, was the error of the distinguished medical men who testified in the case of Huntington. They could not conceive that a sane man could be guilty of the acts of folly and crime of which he stood convicted. If his previous life had been distinguished for moral honesty, for care and prudence, his acts would indeed have been an evidence of insanity. All persons are aware how readily a person who has once entered on a career of crime descends from one step to another, until, crimes from which they would formerly have shrunk with horror, become familiar to their minds; but the transition is gradual and not so sudden as in insanity. In most cases it is connected with some delusion, believing in the existence of persons, things, or circumstances which have no existence in fact.

2. The senses are often changed, sometimes preternaturally exalted. The senses of smell, of hearing, or of taste, is preternaturally acute, sometimes perverted, at other times blunted or destroyed. Natural objects often appear changed, so as not to be recognized; the insane often see objects which have no existence; hear sounds and conversations, often delicious music, which have no existence except in their perverted imagination. Persons with whom the insane associate often become in their diseased imagination clothed with supernatural properties. Real impressions, as in dreams, often form the material for imaginary scenes.

3. The insane antics of madmen are usually the result of their delusion. On one occasion, an insane patient being told that, unless he was quiet, it would be necessary to confine him, he ridiculed the idea, saying he could break any ropes or bands we could place on him, but when seized, and finding resistance was in vain, he at once said if we would relieve him he would be quiet, as he saw the Almighty had given us power to control him.

4. The acts of the madman which are the results of his delusion are often such as no sane man would deem proper to accomplish the object in view.

5. The violence of the insane is often the effect of his delusion and not of mere passion.

6. Insane patients of a reserved disposition, unless impelled by some powerful motive, have often the power of concealing their

delusion. Pinel relates a case where a commission was appointed to visit the asylum and return such persons as were not insane. They examined one patient repeatedly, and on successive days, without being able to discover any evidence of insanity; they at last ordered the papers to be made out for his liberation. It was necessary, before being relieved, that he should himself sign the certificate. On the paper being placed before him he signed himself "Jesus Christ."

7. The acts of an insane man often evince the same forethought and preparation as those of the sane.

8. The insane, notwithstanding their proverbial cunning, are easily imposed upon. A gentleman who was conveying an insane patient to the asylum at Hartford, was abruptly addressed by his patient's saying: "I suppose I am your prisoner." He was asked why he thought so. He answered: "Because I see you carry a cane." "Very well," said he, "you take the cane and then I will be your prisoner," with this he was perfectly content.

9. Insane patients are often conscious of their condition, and understand the legal relations in which they are placed.

THE PLEA OF INSANITY IN CRIMINAL CASES.

From what has been said, it will appear evident that no single test or standard can be adopted to determine the extent of criminality and of responsibility in cases of insanity. All modern writers agree that the former test adopted by the courts of a knowledge of right and wrong is utterly fallacious. We have seen that Judge Beardsley applied it to the particular act, and directed that the prisoner should have sufficient intelligence to understand the object and nature of a trial, and take the necessary measures for his defence. Notwithstanding a knowledge of right and wrong was laid down by the fifteen judges as the test, McNaughton was—about the same time—acquitted on the ground of insanity, in entire violence of this doctrine. The rule laid down by Lord Erskine is only applicable to a particular class of cases. It must, therefore, be evident that there is no particular standard by which the criminality of an act is to be judged. We must take into consideration all the attendant circumstances, the previous history of the individual, his character and conduct—the causes which may have incited him to the criminal act—the manner of its execution,

and the subsequent conduct of the individual. It is not mere eccentricities of character and conduct that constitute evidences of insanity; it is not that a man differs in opinion from his neighbors or from other people. We often meet with such men; they are said to be eccentric, but no one considers them insane, and in no court of justice would their eccentricities be received as an excuse for crime; but it is that the individual differs from his former self. The careful, prudent, and cautious man of a sudden becomes a careless, visionary speculator; his property is squandered and wasted—the fond and affectionate parent becomes tyrannical and morose—and these changes are without any known adequate cause. If we find that an individual whose previous character had been without reproach becomes suddenly altered and he commits a crime which was foreign to his previous character, and if at the same time it is certain that there could be no motive which could actuate a sane man, we would almost instinctively say he must be insane, and in this opinion we would probably be right, whatever might be the decision of a jury. A sane man never acts without a motive which in his view is a sufficient excuse, however unreasonable and unsatisfactory it may seem to others. The madman often acts without motive from an irresistible impulse which he is unable to restrain; or, if he assigns a reason or motive, it is so absurd and inconsistent as to show his insanity. Thus, a mother will kill her child, whom she tenderly loves, because she has been commanded by the Almighty. The entire absence of all rational motive, though perhaps not of itself sufficient to prove insanity, would be a strong evidence in its favor.

The manner in which an act is executed may tend to designate its character. Maniacs are frequently excited by the sight of murderous weapons. The act is often committed, as it were, instantaneously, and on the spur of the moment, without provocation, or any known cause of excitement. Dr. Brigham considered the rapidity with which an act was committed as sometimes an evidence of insanity. Certainly they sometimes act with a celerity which would astonish a sane man.

A murderer sheds no more blood than is necessary for the accomplishment of his object; a madman often kills indiscriminately all who come within his reach. An insane man rarely has an accomplice; a murderer often.

The murderer either premeditates the act, or commits it under the excitement of strong provocation, and, if detected, either denies

or professes his penitence, or sues for pardon, or exults in the act as one of justifiable vengeance. The maniac often plots the accomplishment of his object, and conceals his intentions, but rarely troubles himself about concealment when the act is accomplished. Sometimes, however, and where the evidence of insanity is most marked, great ingenuity is manifested in concealing the crime. An experienced observer, and one familiar with the insane, is often able to determine from the looks of a patient, not only that he is insane, but the character of the insanity. I once saw the late Dr. Brigham, when on the witness's stand—after observing that he could usually tell an insane person from his looks—point to an individual in the back part of a crowded court room, saying, "There is a crazy man," on which the individual sprung up saying, "If he means me, I can prove by a dozen witnesses that I am not crazy." It must be confessed that cases occasionally occur where it is difficult determining the existence or non-existence of insanity; but it is believed that cases are very rare where a person who, from experience and observation is qualified to judge, cannot come to a satisfactory conclusion. Unfortunately, most medical men have paid but little attention to the subject. Patients seldom remain long under their care, being usually removed to an asylum; consequently, little opportunity is afforded of studying its peculiarities.

CASES IN WHICH THE QUESTION OF INSANITY BECOMES A SUBJECT OF INQUIRY IN THE COURTS OF THE UNITED STATES.

I. The right and power of confinement, and personal liberty of the insane.

II. Capacity to perform particular acts, as the disposal of property by will; the making and the execution of particular contracts, where the question is brought into court by contesting the validity of the particular act.

III. General business capacity, in which case the question arises by petition to the court or chancellor for a decree pronouncing the party to be incapable, from lunacy or habitual drunkenness, of managing his property and transferring it to the care of a committee.

IV. Responsibility for crime.

In these several cases, the evidence of insanity, and the amount

of evidence required, would be different. The evidence might be sufficient to invalidate a particular contract, where there was suspicion of fraud or improper influence used, though it might not be proper to deprive the individual of the general management of his property. Again, it might be proper to take measures to prevent a man from wasting or squandering his property, when it would be very unjust to confine him in an asylum. Although it might be proper to deprive a man of the control of his property, and even to restrain his personal liberty, it does not necessarily follow that his insanity is of such a character as to destroy his responsibility for crime.

I. WHAT KIND AND DEGREE OF INSANITY SHOULD DEPRIVE A PERSON OF HIS LIBERTY.

In all civilized countries, making any claim to freedom, the liberty of the subject is secured by constitutional provisions, and the statute-books abound with provisions to enforce and protect this most sacred of rights. Neither life nor property is guarded with the same care, because personal liberty lies at the very foundation of every free government. It is not a little remarkable that, both in England and in this country, the bearing and effect of insanity on this important privilege have not been clearly defined and established by law. Strange as it may seem, in not a single State, so far as I have been able to learn, is there any statute law pointing out the circumstances under which a person may be deprived of his liberty on the plea of insanity; and if we resort to the common law, and examine the decisions under it, we only find a series of conflicting decisions. Most of our lunatic asylums have been established under the auspices of the States, and many of them have some regulations for the admission of patients; but there are no *statute laws* regulating their admission. In the State of New York, and probably in many of the other States, there are provisions that, if complaint is made to a justice of the peace, or a judicial officer, that a certain individual is insane, and unsafe to be permitted to go at large, he may, on the certificate of two physicians, order his confinement. If a person who is a pauper, or supported at the public charge, becomes insane, the overseers of the poor, or poor-master, may place him in the asylum on the certificate of two physicians; but, in a large proportion of cases, patients

are taken to an asylum by their friends or connections, without any preliminary trial or evidence. It is true that a person unjustly confined may sometimes recover his liberty by a writ of *habeas corpus*, and may seek redress for false imprisonment by a suit at law; but surely it would be much better for the patient and his friends, as well as a protection to those who assisted in conveying him to an asylum, that there should be some fixed legal regulation. No one individual should have the absolute control over the liberty of another, and certainly a person, for a friendly and benevolent act to a neighbor, should not expose himself to be persecuted with law-suits, and perhaps mulcted in heavy damages. Any regulations that might be adopted, should be modified by the varying circumstances of the case. In ordinary cases of diseases, where a person is suddenly stricken down, he becomes dependent on the care and attention of his kindred and friends. To minister to the suffering and wants of those we love, is considered a pleasure instead of a burden, and at first view it would seem that it could make no material difference whether it was the brain or some other organ which was diseased; and, in most cases, all that would be necessary would be a legal provision sanctioning the seclusion or confinement of an insane person by his friends or next of kin. A few years since, Chief Justice Shaw, of Massachusetts, laid down the broad principle that the friends of an insane person are authorized in confining him in a hospital by "the great law of humanity."[1] On the other hand, the Lord Chief Baron of the English Court of Exchequer remarked that insane persons could not be legally held in confinement, unless dangerous to themselves or to others.[2]

In an able article on this subject by Dr. Ray, read at a meeting of the Association of Medical Superintendents of American Institutions for the Insane, June, 1850, he recommends that a law should be passed authorizing the friends to confine a person, in all cases where there was no doubt of the insanity, thus securing the important considerations of dispatch, privacy, and those rights which naturally flow from the domestic relations, and that, in cases of doubt, a commission should be appointed similar to that for depriving a person of the control of his property, and that the individual should be brought in person before them. It is a common observation that the chance of recovery is very much increased by an

[1] Law Reporter, Book viii. p. 277.

[2] Nottidge *v.* Ripley, Law Reporter, N. S., vol. ii. p. 277.

early removal to an asylum; and it is well known that many of the cases of suicide, now becoming so frequent, are owing to the incipient development of insanity. As early a removal as possible to a well-conducted asylum is, therefore, the dictate of humanity and prudence. The precise amount of insanity, to justify such removal, must be judged of by the friends and relatives.

II. WHAT DEGREE OF INSANITY INVALIDATES A CONTRACT OR WILL.

1. In regard to *idiots* and *lunatics*, in the ordinary acceptation of the term, there can be no question. Whatever acts they may perform are by law considered invalid, and all control over their property is taken from them. It is in the minor forms of insanity, as in imbecility, partial insanity, lucid intervals, and intoxication, that the question arises as to the validity of contracts. The general principle seems to be that of the individual possessing sufficient capacity to attend to the ordinary duties of life; if the contract itself is not tainted with the appearance of fraud, and no undue influence can be shown to have been used, it should be considered valid. On the other hand, if the persons had not been considered competent to manage their affairs, had been under the charge of guardians, or that fraud or improper influences had been used, the contract would be considered invalid. In cases of wills, the courts have been governed more by the character of the instrument, and the apparent sanity at the time of making the will, than on any evidence of insanity previous to or subsequent to the making of the will. In a case of contested will, where the writer was called as a witness, it was clearly proved that the individual had been insane; that he had attempted to commit suicide previous to the making of the will, and succeeded in hanging himself subsequently. It was admitted that the will was a judicious disposition of his property, and the gentleman who drew the will and witnessed it testified that at the time there was no evidence of insanity. The will was sustained. In the celebrated case of Lord Portsmouth, the judge before whom the case was tried, not only came to the conclusion that Lord Portsmouth was of unsound mind, and his marriage consequently invalid, but the broad position was taken by him that weakness alone, when circumvented by fraud, would be sufficient to invalidate so solemn a contract as marriage. While, on the one hand, the courts will not lend their aid to execute or carry into effect a contract,

entered into by an incompetent person, unless, perhaps, for necessaries, where the fact of incapacity was known to the creditor; yet such is not the law when the incapacity was unknown, and no advantage had been taken, and particularly if the contract had been in part executed.

2. *Partial Insanity.*—Without at present entering into a consideration of the question of the possibility of partial insanity, it is sufficient to state that, although there have been some decisions which may be considered exceptions, yet the general rule seems established that partial insanity does not invalidate a contract, unless it involves the particular subject of delusion.

The same principle applies to the making of a will. The mere existence of eccentricity, or even the existence of delusion, if the individual at the time of making the will had ordinary business capacity, does not impair its validity, unless it appear that such delusion has influenced the person in making the will, as if such a person have an unreasonable prejudice against a person or persons, who are the natural and legal heirs, and for the purpose of depriving them of their natural rights, makes a different disposition of his property.

3. *Lucid Intervals.*—A person who is proved to be, or to have been, actually insane at the time of making a contract, or making a will, of course has no power of making a valid disposition of his property. It may, however, be contended that, although a person may be proved to have been previously insane, or to be insane at the present time, yet at the time of making the contract he had a lucid interval, in such case the burden of proof lies with those who would maintain the validity of the contract. The proof of previous insanity is considered *prima facie* evidence of insanity. If, however, it can be clearly shown that there was an actual restoration of reason at the time, it is considered valid. The older law writers dwelt at considerable length on the subject of lucid intervals as of frequent occurrence; but writers on insanity who have had most opportunity of judging, are rather skeptical on the subject, and whilst they admit that insane patients are at times more or less violent, they contend that they can never be considered as rational and responsible agents, unless there is a complete recovery and restoration to reason. It is not then sufficient to prove a mere subsidence of excitement, but a complete recovery. A somewhat different doctrine, however, has been applied to idiots, as it is justly supposed that the disease does not vary. If they are proved to

have transacted business in a rational manner, it is deemed a proof of business capacity. When no extraneous influence is shown to have been used, the character of the act itself goes far to determine the capacity of the party at the time.

4. *Intoxication.*—It is generally admitted that intoxication disqualifies a man from making a valid contract or will. It is, however, on the principle that there is fraud, either open or implied, as it is contended that no person would make a contract with a drunken man, unless he had some sinister design. It has even been considered a valid defence, as against an innocent party, as in case of an indorsement of a note; but, if a man is capable of writing his name legibly, it is doubtful whether a jury would excuse him on the ground of incapacity. A man is not, however, permitted to take advantage of his own acts under this plea, as where a man has purchased goods, and appropriated them to his own use, and then sets up the plea of incompetence as a defence. In actions for personal injury to the person or property of another, the existence of intoxication is no defence; but, in a case of accident from negligence or oversight, the existence of intoxication may be proved. Thus, in a suit for damages for running a sleigh against the plaintiff, Justice Gibson said the evidence of intoxication ought to have been received, not because a drunken man's acts are different from a sober man's acts, but because, where the evidence of negligence is nearly balanced, the fact of drunkenness might turn the scale, inasmuch as a man partially bereft of his faculties would be less observant than if he was sober, and less regardful of the safety of others. For this purpose, but certainly not to influence the damages, the evidence ought to have been admitted.

Drunkenness to such an extent as to render a man unconscious of what he is doing, or even in a slight degree, when it renders him more subservient to the influence of others, is sufficient to invalidate a will; but the proof of habitual drunkenness, unless it appears that he was under the influence of liquor at the time, or that it has impaired his faculties to such an extent as to disqualify him for the transaction of ordinary business, will not destroy its validity.

III. WHAT IS NECESSARY TO BE PROVED TO DEPRIVE A MAN OF HIS ESTATE, OR THE MANAGEMENT OF HIS PROPERTY.

In England, and most if not all of the States in this country, provision is made by law for the protection of the property of such persons as, from unsoundness of mind or from habitual drunkenness, are incapable of managing it themselves. When any person is suspected of such disability from either of the above causes, any person having an interest in the estate may make application to the proper judicial officer. On such application being received, the judge appoints a commission to examine into the facts of the case; such commission summons a jury, who, after hearing the testimony on the respective sides, and the charge of the commissioner as to the law, return their verdict whether the respondent is, from lunacy or habitual drunkenness, incapable of managing his estate. If the verdict is in the affirmative, the judge then appoints a committee to take charge of the estate. The respondent, however, has the right to traverse the finding—*i. e.*, to put in a formal denial of it, in which case the question is determined before a court and jury in the same manner as any other contested fact.

In an examination of this character, the witness is not to confine his examination to the validity of any single act, but the general capacity for managing his affairs. There are many cases on record of persons who have managed their affairs with great shrewdness and success, and yet on some subjects have been clearly insane. On the other hand, no matter how much shrewdness he may manifest at times, if he is reckless and improvident in the general management of his affairs, it may be necessary to take from him the control and management of his property. The first question is, has the respondent sufficient mental capacity? If it is decided that he has, the next question is: Are his capacity and judgment so perverted by insanity or habitual intemperance, as to deprive him of the power of control over his actions?

In regard to habitual drunkenness, it is evident that occasional intoxication does not render a man an habitual drunkard. Neither, on the other hand, does it require that a man should be constantly drunk. Justice Knox, after stating the difficulties of the case, and that it was one for the jury to decide, adds: "The court has no hesi-

tation in saying, that the man who is intoxicated, or drunk the one half of his time, should be pronounced an habitual drunkard."

IV. WHAT DEGREE OF INSANITY AVOIDS RESPONSIBILITY FOR CRIME.

Much of the difficulty and confusion on this subject, it is believed, has arisen from the attempt on the part of the courts to establish a general arbitrary rule for all the different forms of insanity. Thus, we are told by the courts, both in England and the United States, that the true test is a knowledge of right and wrong. Some state that it is not a general knowledge of right and wrong, but a knowledge as regards the particular act. Lord Erskine, having a case in which this doctrine would not apply, insisted that the existence of delusion was the true test; whilst some recent charges have instructed the jury that, "if they believed the prisoner was impelled by an irresistible impulse which he could not control, he should be acquitted." Let us examine these several tests separately, and see whether it is not possible to reconcile the different positions taken by the courts.

1. When the defendant is incapable of distinguishing between right and wrong in general terms. Though this was formerly the doctrine held by the courts, and is still occasionally propounded to the jury, it is so contrary to reason and humanity as to be generally abandoned. Certainly nine-tenths of the patients confined in our asylum can distinguish between right and wrong in the abstract. On one occasion, the late Dr. Brigham questioned one of the crazyest patients in the asylum, and asked him if it was right for one man to kill another. The reply was: "It would not be right for you, or any one else; but it would be right for me; for I am *God Almighty*, and have a right to do what I please."

2. When the defendant is incapable of distinguishing between right and wrong in reference to the particular act. In cases of idiocy, imbecility, and some cases of general mania, the question whether the prisoner had sufficient capacity to appreciate the nature of the crime and its consequences, is the true question to be put to the jury. The rule laid down by Judge Beardsley, in the case of Wm. Freeman, is perhaps the just one. In order to be tried, the prisoner should have sufficient capacity to understand his situation, and to employ counsel, and direct as to his defence. The witness,

in judging of the capacity of the prisoner, must judge not merely from his present appearance, but also his antecedents, his previous history, the injuries he may have received, his education, and the question whether his parents or family have been insane. In the answer of the fifteen judges in England, they say: "The jury ought to be told in all cases, that every man is presumed to be sane, and to possess a sufficient degree of reason to be responsible for his crimes until the contrary be proved to their satisfaction. And to establish a defence on the ground of insanity, it must be clearly proved that, at the time of committing the act, the party accused was laboring under such a defect of reason from disease of the mind, as not to know the nature and quality of the act he was doing, or, if he did know it, that he did not know that he was doing what was wrong."

3. When the defendant is laboring under an insane delusion. In the trial of Hadfield, in 1800, Lord Erskine took the position and maintained it with all the force of his eloquence, that delusion is the true test of insanity, thus repudiating the test of knowledge of right and wrong. After showing that the test, as laid down by the attorney general, only applies to idiots and persons laboring under delirium, he says: "Delusion, therefore, where there is no frenzy or raving madness, is the true character of insanity; and where it cannot be predicated of a man standing for life or death for a crime, he ought not in my opinion to be acquitted. I must convince you, not only that the unhappy prisoner was a lunatic within my definition of lunacy, but that the act in question was the *immediate unqualified offspring of the disease.*"

The question propounded to the fifteen judges was: "If a person under an insane delusion as to existing facts, commits an offence in consequence thereof, is he thereby excused?" They say: "The answer must depend upon the nature of the delusion; but making the same assumption as we did before, viz., that he labors under such partial delusion only, and is not in other respects insane, we think he must be considered in the same situation as to responsibility, as if the facts which he supposes to exist were real. For example, if under the influence of his delusion, he supposed another man to be in the act of attempting to take away his life, and he kills that man as he supposes in self-defence, he would be exempt from punishment. If the delusion was that the deceased had inflicted a serious injury to his character and fortune, and he killed him in revenge for such supposed injury, he would be liable to

punishment." The mere existence of delusion is not therefore sufficient to exempt from responsibility.

There are many persons in the community laboring under delusion without impairing their usefulness. But a few years since, there were many persons who firmly believed the world was coming to an end at a particular time, and many good citizens at the present time believe they can converse with their departed friends through the agency of spiritual mediums. Though these are no doubt delusions, they would not properly be termed insane delusion. Insanity we believe to be caused by disease or disordered functions of the brain. To constitute an insane delusion, it must arise from such cause, of which there will be some evidence aside from the delusion itself.[1] To excuse for the commission of crime, the delusion must not only be insane, but the crime must be the "*immediate* unqualified offspring of the disease."[2] Thus, a man may believe he can control the motion of the heavenly bodies, or that he is Governor of the State, or President of the United States. And yet, if he was to commit a homicide from motives of revenge or to appropriate the property of another to his own use, he would be held responsible. If, on the contrary, he believed that the act was necessary to save his own life, or, as has frequently been the case, he firmly believes he was commanded by a higher power to commit the act, and that it was his duty to obey, though fully aware of the consequences, he must be considered irresponsible. Some years since, a man was tried for the murder of his two children. He was proved to have been steady, industrious, and tenderly attached to his family, and the only reason he could give was that he had been commanded from heaven to destroy them, and thus save them from the suffering and misery of this life. Several letters which the writer saw written to his wife whilst in prison breathe forth the most ardent attachment to her and the children. He was tried for

[1] The term delusion, as used in a medico-legal sense, is somewhat different from the general acceptation of the term. Bucknell thus defines it: "A delusion is a belief in the existence of things which have no existence in reality, or an erroneous perception of the nature of things, or of their relation to each other occasioned by cerebro-mental disease.

[2] Dr. Bucknell dissents from this generally received doctrine, and contends that as an insane delusion proves the existence of diseased action of the brain, and consequently the existence of insanity, the person should be exempt from punishment, though there did not appear any necessary connection between the delusion and the particular criminal act.

murder, convicted, and sentenced to execution. The letters written after the sentence breathe no complaints, no fears; he spoke freely in them of the time appointed for his execution, as the time when he would join his children, who had gone before him to heaven. Through the interference of some kind friends, his punishment was commuted to imprisonment for life.

4. Where the defendant is impelled by a morbid and uncontrollable impulse. Few cases have arisen more difficult of adjudication than those under consideration. Whilst no doubt can exist that cases of this character occur, and that where it really exists, the individual should not be held responsible, yet the maxim requires to be guarded with extreme care, to prevent abuse. In the trial of Rogers, for killing the warden in the Massachusetts State Prison, in 1844, Chief Justice Shaw says: "Are the facts of such a character, taken in connection with the opinion of professional witnesses, as to induce the jury to believe that the accused was laboring for days under monomania, attended with delusion, and did they indicate such a state of diseased mind, that the act of killing the warden was to be considered an outbreak or paroxysm of disease, which, for the time being, overwhelmed and superseded reason and judgment, so that the diseased was not an accountable agent? If such was the case, the accused is entitled to an acquittal." Chief Justice Gibson, in a case tried in Pennsylvania, in 1846, in his charge to the jury, after speaking of the test of right and wrong, adds: "But there is a moral or homicidal insanity consisting of an irresistible inclination to kill, or to commit some other particular offence. There may be some insane ligament pressing on the mind, drawing it to a consequence which it cannot avoid, and placing it under a coercion which, while its results are clearly perceived, is incapable of resistance. The doctrine which acknowledges this mania is dangerous in its relations, and can be recognized only in the clearest cases."

Numerous cases are on record where mothers under the influence of such impulse, have killed their children, and of others who have begged to be confined, or to have their children removed from their presence. A case is related of a gentleman who had been suffering from ill health, who on one occasion ordered his whole family to quit the room, and subsequently locked himself in his own room. His physician found him in a state of great excitement, when he informed him that it was with the utmost difficulty that he restrained himself; had his family not quitted the room he

certainly would have killed them; and that he had locked himself in to prevent doing them an injury. Not long since, the writer was consulted by a gentleman, who, as he learned from the friend, had been melancholy and low spirited, which rendered his friends somewhat anxious. When on one occasion he seized an axe and split open the head of a favorite dog, no provocation had been given, and on questioning him, he seemed unable to give any reason or explanation whatever. A very intelligent gentleman, a friend of the writer, mentioned a few days since a circumstance which occurred to him some years since, and which seems to throw some light on the subject of impulsive insanity. At the time when it was fashionable to exhibit the effects of nitrous-oxide, and of sulphuric ether by breathing it, among others he breathed the ether; being of a very excitable temperament, he was very much affected, and for the time entirely lost his consciousness. For some time afterwards, whenever much excited, he felt precisely the same symptoms as when he took the ether, until he became alarmed for the result. On one occasion, he struck his room-mate a severe blow in the face; on another, threw a billet of wood at a fellow student, which might have been attended with serious consequences —acts which nothing would have induced him to do in his right mind, and of which he had no knowledge or recollection when the paroxysm was over. Whilst therefore, it would be unwise to reject the doctrine of impulsive insanity, some collateral evidence, such as previous or subsequent ill health, its contradiction with the former character and conduct of the prisoner, the absence of all rational motive, or the hereditary predisposition; should be required.

Pinel was the first to advance the idea of impulsive insanity. He says: "There are madmen in whom there is no perceptible aberration of the intellectual processes; of the perception, judgment, or memory, and yet a perversion in the manifestations of the will in a blind impulse to the commission of violence and blood-thirsty rage, without any assignable dominant idea, or any delusion of the imagination which could cause such a propensity." Although the doctrine of impulsive insanity has been sustained by many able writers, and, as we have seen, been sometimes admitted by the courts, there are not wanting recent writers, who reject the whole doctrine of moral insanity under which this particular form is placed. Among these, are Heinrich, Lenbuscher, Winslow, Mayo, Bucknell and Wharton. Dr. Bucknell says: "The existence of

the third class in which the impulse is sudden and unreflected on, admits of grave doubt." "The testimony in favor of the existence of such a variety is very scanty and unsatisfactory; and it is improbable that cerebro-mental disease can develop itself in so sudden a manner. It is probable that the cases of insanity which have been placed under this head were less recent and sudden than they were supposed to be. The earlier stages of diseased feeling had been unobserved by others, and unacknowledged by the patient."[1]

When we come to examine the opinion expressed by Dr. B., it will not be found so adverse to the received opinion as we might at first suppose. That such cases are of frequent occurrence, the testimony is ample. Dr. B. thinks it one of the forms of development of pre-existing disease. No writers, so far as our knowledge extends, have ever supposed that the disease of which the homicidal paroxysm was but the expression, occurred so suddenly, but that the patient had the art or power to conceal it, until it suddenly burst forth.

V. HOW INTOXICATION AFFECTS RESPONSIBILITY FOR CRIME.

1. Insanity, when produced by intemperance, assuming the form of delirium tremens, affects the responsibility in the same way as insanity produced by any other cause. Although a contrary doctrine has some time been held, and persons have been punished for crimes committed whilst under a paroxysm of delirium tremens, yet the weight of authority would place them on the same footing as persons insane from any other cause. As far as concerns temporary incapacity, delirium tremens acts in the same way as any other form of delirium, and when complete, destroys the moral as well as the intellectual responsibility. The argument that, because it arose from voluntary intemperance, has no force, as a large proportion of the cases of insanity from other causes arise from vices or follies voluntarily committed.

2. Insanity immediately produced by intoxication, does not destroy responsibility, when the patient made himself voluntarily intoxicated. Drunkenness, unless it be extreme, does not entirely

[1] Dr. B. objects to the term impulsive insanity, and would substitute the term insanity, without delusion.

destroy the moral or intellectual powers, and although there are some persons who seem entirely bereft of reason, and become furiously mad, yet, knowing as they do the effect which liquor produces on them, if they voluntarily place themselves in the condition, justice and a due protection of the community require that they should be held responsible. There is one circumstance which might appeal strongly to the sympathy of a jury, though it is doubtful whether it should qualify the above rule, viz., when a person, from previous injury to the brain, or from disease or peculiarity of the constitution, is rendered deranged by a quantity of liquor which would not affect a person differently constituted. When the question of *malice prepense* is agitated, the intoxication of the party may be shown. Thus, a man committed homicide by killing his wife, under circumstances where the act itself might be considered evidence of *malice prepense*, had it not been made to appear that both husband and wife were drunk at the time.

SUMMARY.—From the above, the following propositions may be considered as established by various judicial decisions, in this country, where the plea of insanity is set up in defence in criminal prosecution.

1. Was the prisoner—at the time of committing the act—capable of distinguishing between right and wrong, in regard to the particular act? *i. e.*, was he capable of appreciating the criminality of the act, and the consequences which would result, and the penalty for its commission? If so, he is considered responsible. Or,

2. Was the prisoner, at the time of committing the act, laboring under an insane delusion? The mere fact that the prisoner was laboring under a delusion is not considered a justification, unless there is a direct connection between the delusion and the criminal act. Or,

3. Was the prisoner impelled to the commission of the act by an insane impulse which he could not control? By an insane impulse is not meant a mere burst of rage or passion, or excitement which he may not control, but an impulse resulting from cerebromental disease; consequently, it is necessary to show some other evidence of disease than the act itself, as a change in his character; its incompatibility with his former character and conduct; the absence of all motive, or of motives which could influence a sane man; the existence of insanity in his family, or a hereditary pre-

disposition; a previous injury, or ill-health, showing evidence of disease. In the absence of such collateral evidence the prisoner would usually be held responsible.[1]

The question to the jury should be simply, Is he proved to be insane: not whether he can distinguish between right and wrong, or any other particular test. The divisions into intellectual and moral insanity; into general and partial, though appropriate in a scientific work on insanity, are not recognized by the courts of justice.

The law presumes every person sane until the contrary is proved. Consequently, the burden of proof rests with those claiming an exemption on the plea of insanity; but if the person has before been proved to have been insane, the presumption is that he is still so, and the prosecution must prove his recovery. In the case of the People *v.* William Spear, for arson, in burning the lunatic asylum, tried at the Oneida Circuit, in March, 1858, it appeared that some years previous the prisoner had been tried for arson in New York, and acquitted on the ground of insanity, and sent to the asylum at Utica. Judge Allen charged the jury that the prosecution must prove his recovery at the time the act was committed.

[1] It has been contended by some that by long indulgence, the passions may acquire such force and strength that they are no longer under the control of the will, or, in other words, irresistible, and that such persons should be considered insane, and consequently irresponsible, though there is no evidence of disease. It is very questionable whether, in the absence of disease, they ever acquire such force that they cannot be controlled by sufficiently powerful motives; but, admitting its truth, it would be very dangerous to admit that it renders a person irresponsible, and it would be a grave question whether the good of the community did not demand that it be placed in the same category as a man who voluntarily rendered himself insane from drunkenness. Dr. Bucknell says: "The real question is not whether the emotions occasioning the overt act are beyond the power of the individual to control, but whether they are the result of disease."

It may be said that, as we cannot know the disease of the brain, except by the symptoms, and that insanity is an evidence of diseased brain; that it is only reasoning in a circle to say we must prove disease of the brain to prove insanity; this is partly, but not strictly true. There are many evidences of disease of the brain, that are not evidences of insanity, and disease of the brain may exist without insanity. The act itself may not prove either insanity or disease, but taken in connection with other evidence of disease, may prove both disease of the brain and insanity.

FEIGNED INSANITY.

Insanity is most frequently feigned to escape punishment for crime, or by persons already convicted and imprisoned to avoid the punishment of labor, and escape from prison. Consequently, it is seldom feigned, except where some particular object is to be gained.

Idiocy is seldom feigned, and when it is, is easy of detection. The previous history of the individual would usually expose the imposition. In addition, the real idiot has usually some deformity of the head, which accounts for his condition.

Imbecility, though not often feigned, is more so than idiotism, and is more difficult of detection, as the distinction between this condition of the mind and that of health is not so marked as that of idiocy; still, where the previous history of the individual is known, it would not be difficult detecting the feigned disease. It is only in those cases where we are compelled to judge without this knowledge, that an intelligent physician might be deceived. A memorable case of this kind occurred in New York, in the case of Mrs. Cochran, who, for a time, succeeded in baffling Dr. McDonald, and others, until at last she was detected in listening at the key-hole of her door to overhear the consultation of physicians sent to examine her. In cases where the previous history is unknown, the peculiar expression of the countenance will aid in forming an opinion. The dull, stupid, and wandering look; the want of connection in the ideas; the pusillanimous and submissive manner, with sudden and strange gusts of passion, are difficult to assume. The history of the individual, as given by himself, may aid us in forming an opinion. In the real imbecile, stupidity and shrewdness are usually equally displayed on all subjects; but, when feigned, shrewdness will be manifested on subjects involving his own interest, or the success of his scheme, and his stupidity on those which are indifferent. All the conversation of the person feigning tends to criminate others, and exculpate himself, whilst that of the real imbecile tends to criminate himself.

Dementia, like the two former, is seldom feigned. In attempting it, the impostor generally indulges in pretended hallucinations and mental excitement, which is inconsistent with this form of insanity.

Mania.—This form of insanity is more easily assumed, and more difficult of detection than the preceding, and consequently is more frequently feigned. The distinction between the true and the feigned disease, though it may require time and close observation, is usually not very difficult. Most persons who attempt to feign mania, overact the part they assume, and thus expose themselves to detection. The peculiar haggard look; the striking wildness of the eye, of the real maniac cannot be imitated. The real maniac will often pass days, and sometimes weeks, without sleep, or if he sleeps at all, it will be disturbed and agitated; whereas, it is as difficult for a person feigning mania to avoid sleep, as it is for the real maniac to obtain it. Another character of true mania is the insensibility to the operation of medicines, particularly opiates; whereas, the feigned maniac cannot resist their operation. The true maniac is comparatively insensible to external impressions, and resists, in a remarkable degree, the influence of cold, hunger, and thirst, without complaint. A peculiar odor or emanation, given off by the body of the true maniac, is generally mentioned as a means of detection. By carefully watching a person feigning mania, it will be found impossible for him to maintain, for a long time, his pretended excitement; he will, therefore, become quiet, when he supposes he is not observed, and resume it whenever any one is present to notice it. That peculiar perversion of the moral feelings, which causes the maniac to dislike his friends, not being generally understood, is not often assumed.

Partial Intellectual Mania.—Few persons who have not made insanity a particular study, are sufficiently acquainted with the peculiar form under consideration, to attempt its imitation. Persons pretending partial insanity are constantly recurring to and leading to the subject of their particular delusion. Whereas the person who is really insane, seldom refers to it unless closely questioned, as if seeking to avoid it, but when questioned takes no pains to reconcile his delusions with other facts. The ungovernable fury which opposition and argument produce in most maniacs is a striking peculiarity of insanity. Many of the peculiarities mentioned as belonging to mania, such as inability to sleep, the irritability of temper, the violent prejudices and insensibility to impressions, belong equally to partial mania.

Moral Insanity.—As this form of insanity has never been recognized by the courts, as rendering the individual irresponsible for crime, it would not be likely to be feigned.

Concealed Insanity.—Though many, and perhaps most insane persons, may for a time conceal the approach of the disease, yet when fully formed, they can no longer so control their thoughts and actions as not to betray the disease. I have, however, no doubt there are many in society who indulge in strange delusions, who are on the verge of insanity, and who, could their thoughts and feelings be known, would be considered as maniacs, and yet succeed in controlling their actions, and eventually recover without their condition being ever known to any but themselves.

TESTIMONY OF SKILLED WITNESSES IN COURTS OF JUSTICE.

The principal object of all government is the protection of life, liberty, and property; it is for this that laws are established and penalties attached to their violation, and that government may, perhaps, be considered best where these objects are most perfectly accomplished. Penalties are attached to the violations of the law for the purpose of preventing their commission, and by the force of example to prevent others from committing the same act; it is not for man to judge and inflict punishment as punishment for the transgression. The efficacy of punishment for the prevention of crime must depend in a great measure upon the certainty of detection and the infliction of the punishment. The celebrated Jeremy Bentham is said to have expressed the opinion that a mild punishment, if it was certain to be inflicted, would be more effectual in preventing crime than a much more severe punishment, that was uncertain. Perhaps, therefore, we would be justified in the assertion, that the most important officer connected with criminal jurisprudence, is the one upon whom devolves the duty of investigation and detection of crime. In this country that duty devolves mainly on the coroner, an office the faithful discharge of the duties of which demands talents of a high order, a knowledge of human nature, of the motives to criminal action, and the means resorted to by criminals to accomplish their object. It is the particular duty of the coroner to examine into and investigate the cause of death when it occurs suddenly, or under suspicious circumstances. As almost every such case of death requires a *post-mortem* examination for its elucidation, there would seem a natural propriety of having a medical officer associated with the civil authorities. In almost every country on the Continent of Europe, there are medical offi-

cers appointed by government to assist and aid the authorities in the investigation of crime. In England, the coroner is authorized to call to his aid any medical practitioner who has been in attendance, or is in actual practice, and to pay him as for professional services one guinea for testifying, and two guineas for a *post-mortem* examination. In the State of New York, the coroner is required to call to his aid a medical man, but no provision is made for his compensation; sometimes a slight remuneration is allowed by the Board of Supervisors. When a medical man is called to testify to facts within his knowledge, he is in the capacity of an ordinary witness, and is not expected to express any opinion, or draw any conclusions from the facts. If, for instance, he has made a *post-mortem* examination in a case of a wound, he should state the situation and character of the wound; what parts are injured; but not to express any opinion as to the effect of such an injury, or whether or not it was the cause of death. In most cases, however, the physician is called on to testify both as an ordinary and as a skilled witness, *i. e.*, to testify to the facts, and to express an opinion as to the deductions to be drawn from the facts. It is customary on the trial for both parties to call witnesses, simply as experts or skilled witnesses; who, after hearing the testimony as to the facts, are to give an opinion as to the deductions to be drawn from them, as in the above case; after hearing the description of the wound, he gives an opinion as to the ordinary effect of such a wound, but not whether it was the cause of death in the particular case. This is a matter which belongs to the jury. In a case of suspected insanity the witness hears the testimony, and then states to the jury what in the testimony goes to prove or disprove the supposition of insanity. It is the custom in this country for both parties to summon as many persons as skilled witnesses as they please, and the numbers depend upon the interest of the case, the difficulties involved, or the zeal and energy of the respective counsel. Any medical man may be summoned as a skilled witness.

Though the law requires that a medical man when subpœnaed should attend the court for the purpose of giving his testimony, there is no provision made for paying him for his time and services, or even defraying his necessary expenses. If a medical man has a knowledge of any facts connected with the case, it is his duty—as that of any other good citizen—to attend court and give his testimony. I am, however, unable to see on what grounds a medical man is required to attend the court, and hear the testimony, in

order to qualify himself to form an opinion, and then to testify before the court. It would be just as consistent to require legal gentlemen to attend the court, hear the testimony, and then aid the court with the benefit of their opinion. If the attendance of medical men as experts is really necessary, they should be designated by the court, and not by the respective parties, and should not only receive a reasonable compensation for their professional services, but should be protected from insult and abuse from the counsel on the respective sides.

The present system of permitting both parties to summon as many witnesses, and whom they please, is not only oppressive to the witnesses, but wastes the time of the court, prolongs the trial, and serves no useful purpose whatever. Of course neither party would call a witness to the stand without knowing something of what he will testify to, and the consequence is, that a dozen witnesses on the respective sides are arrayed against each other, and it is not unfrequent that the ingenuity of the counsel on the respective sides, is more engaged in picking flaws in the testimony of the adversary's witnesses, than in elucidating the truth or justice of the case. The jury, instead of being enlightened, is only confused by the conflicting testimony of the witnesses. The only security for the medical witness, when called as an expert—if he does not choose to testify—is not to acquire the necessary information, and when called to the stand, to say he knows nothing about it, or that he has formed no opinion. If, however, he concludes to form an opinion and testify, there are certain rules and regulations which he should adopt, not only to give force to his testimony but for his own protection.

1. He should listen attentively to the testimony, as to all the facts in the case, and avail himself of every authentic means of forming a correct opinion.

2. He should studiously guard against being biassed, either by popular clamor, or because he is called by one side rather than the other. He is to form his opinion exclusively from what appears in evidence, excluding, as far as possible, any previous prejudices, or what he may have seen in the papers, or heard from rumor.

3. The medical witness is not to take into consideration the influence which his testimony may have on the prisoner at the bar, or the case under consideration, if he is testifying as to facts. He states the facts as he understands them. If it is a matter of opin-

ion, drawn from the facts, he should state it honestly; but, if he has doubts, he should express them.

4. The expert is called to testify as to the bearing of the testimony given, and though he may have his own doubts of the truth of the testimony, yet, if it stands unimpeached, he must receive it as true. It is not proper for him to call in question the testimony of another witness; at the same time, he is not required to say he believes him, but can say that the testimony of the witness or witnesses prove so and so, leaving the jury to judge of its credibility.

5. A medical witness should not assume the province of the jury; as, for instance, to say a particular wound was the cause of death; he should only state what would be the ordinary effect of such a wound; or, in a question of insanity, that the testimony given was an evidence, or was not an evidence of insanity.

6. A medical man, in giving his evidence, may refer to authority as sustaining his opinion, but is not permitted to read from books. Such is the rule in the English courts, and generally adopted in this country. I do not know how Dr. Beck fell into the error of expressing a contrary opinion.

7. The medical witness should have his mind fully prepared, before taking the stand, as to what he can testify to, and his reasons, if they are required. He should, in his testimony, avoid, as much as possible, the use of technical or professional terms, which the jury would not be likely to understand; but if unavoidable, then their meaning should be explained to the jury. In giving his testimony, he should keep cool and collected, and not permit himself to be irritated or confused by the counsel; and should avoid introducing any expression or opinion not immediately connected with the cause before the court.

Much prejudice exists in the community against the plea of insanity in criminal cases, and medical witnesses have been unsparingly denounced, because they dared to testify to its existence in opposition to popular clamor, because, as was asserted, persons who were not insane have sometimes escaped under this plea. It is believed that in almost every case of this description, it will be found that it was the force of outside pressure sympathizing with the prisoner, and not the testimony of medical men, that secured his acquittal. It has been contended by some, that it were better that innocent men, or those who were really insane, should sometimes suffer, than that punishment should be rendered uncertain through the plea of insanity. Such persons should remember that

it is only when the certainty of punishment is coupled with justice, that it is effectual in the prevention of crime. The instinctive feeling of humanity revolts at the idea of inflicting the punishment of death on a fellow-being who is not a responsible agent, and who is already, by the infliction of Divine Providence, suffering one of the sorest afflictions to which man is liable, and thus the very object of the severity would be defeated.

If called in a case of supposed insanity, the witness should examine the general appearance of the individual, the shape of his head and body, the expression of countenance, the temperament, his movements, gait, &c.; ascertain the present and previous condition of his general health, the organs of digestion, appetite, &c.; whether he sleeps well, is quiet or restless; and how affected by cold; ascertain whether he has any hereditary predisposition; whether any other members of the family have been insane, or subject to fits or any marked eccentricities of character. If the mind appears unsound, inquire how long it has been so, whether from infancy; if not, did it supervene on any severe injury, disease, or mental shock, or long-continued mental application? Has he been subject to epileptic fits? Has he indulged in the use of intoxicating liquor, or in any solitary vice? Has he been subject to involuntary seminal discharges? Does the state of his mind or his feelings, taste, or habits, differ materially from what it was when he was reported sane? If the object of an examination is to test his capacity, get him to give an account of himself and family, what year he was born, the occupation of himself or friends, the use of money, &c.; inquire where he had lived at different times, whom he was acquainted with. If the object is to test his sanity, and not his capacity, ascertain, if possible, if he has any delusion. If the insanity is supposed to affect his moral feeling, inquire particularly as to his motive. When under examination, the medical witness should have clear and distinct ideas of what he states, and should not permit himself to be driven from his position by sophistry of counsel. He should never attempt to explain what he himself does not understand; it is better to say he does not know, than to give the counsel an opportunity of exposing his ignorance.

It is a question not yet settled, whether it is proper to put the question to a witness, whether he considered the prisoner insane, after hearing the testimony. It is an improper question to put to a witness, though it is often done. On one occasion, an English judge censured a witness very severely for expressing an opinion,

thus assuming the prerogatives of the court and jury. A witness should not answer such a question without first referring to the court for instruction. The true duty of the witness is to state what are, or what not, the evidences of insanity which he may have seen. When called as an expert, and compelled to predicate his opinion on the testimony given, he is called upon to testify as to what has been proved. It may happen to differ very widely from his own private belief. Thus, he may doubt the testimony of a particular witness, but his testimony stands unimpeached. In a case of supposed insanity, he may feel satisfied that, could the facts be reached, the prisoner would be found to be insane; but the defence has failed to show it, and the medical witness can only say what has been proved, and not what he thinks may remain unproved.

It has been questioned whether a medical man who has not paid particular attention to the subject of insanity should be considered an expert. It has been contended by Judge Edmons, of New York, and the sentiment is advanced by Judge Hornblower, of New Jersey, that a physician who has not paid particular attention to the subject, or had an opportunity of becoming acquainted with the case, is no better qualified to judge than an observing person who is not a physician, but who is familiar with the subject. Judge Hornblower says of medical men: "If they have not been in the habit of seeing him (*i. e.* the prisoner), if they were not familiar with his habits and symptoms, at or about the time in question, their opinions in relation to a particular individual are of no more weight, and, in my judgment, of not so much weight, as those of unprofessional persons, of good sense, who have had ample opportunity for observation." It is, however, no doubt true, that professional men who have made the subject of insanity a particular study—who have had the charge of insane patients, and have had ample opportunity to study its phenomena—though they may have never seen the prisoner before the trial, and are compelled to depend on the testimony of other witnesses, are much more competent to judge of the existence of insanity than unprofessional witnesses, though of equal or superior natural capacity. The following extract from the charge of Chief Justice Shaw, in the trial of Abner Rogers, Jr., indicted for the murder of Charles Lincoln, Jr., January 30th, 1844, presents the generally received doctrine as to the testimony of skilled witnesses:—

"The opinions of professional men on questions of this descrip-

tion are competent evidence, and in many cases are entitled to great consideration and respect. The rule of law in which this proof of the opinion of witnesses who know nothing of the actual facts of the case is founded, is not peculiar to medical testimony, but is a general rule, applicable to all cases, when the question is one depending on skill and science in any particular department. In general, it is the opinion of the jury which is to govern, and this is to be founded upon the proof of the facts laid before them. But some questions lie beyond the scope of the observation and experience of men in general, but are within the observation and experience of those whose peculiar pursuits and profession have brought that class of facts frequently and habitually under their consideration. Shipmasters and seamen have peculiar means of acquiring knowledge and experience in whatever relates to seamanship and nautical skill.

"When, therefore, a question arises in a court of justice on that subject, and certain facts are proved by other witnesses, a shipmaster may be asked his opinion as to the character of such acts. The same is true in regard to any question of science, because persons conversant with such science have peculiar means, from a larger and more exact observation and long experience in such departments of science, of drawing correct inferences from certain facts, either observed by themselves, or testified to by other witnesses. A familiar instance of the application of this principle occurs very often in cases of homicide, when, upon certain facts being testified to by other witnesses, medical persons are asked whether, in their opinion, a particular wound described would be an adequate cause, or whether such wound was in their opinion the actual cause of death in the particular case. It is upon this ground that the opinions of witnesses who have long been conversant with insanity in its various forms, and who have had the care and superintendence of insane persons, are received as competent evidence, even though they have not had an opportunity to examine the particular patient, and observe the symptoms and indications of disease at the time of its supposed existence. When such opinions come from persons of great experience, and in whose correctness and sobriety of judgment just confidence can be had, they are of great weight, and deserve the respectful consideration of the jury.

"One caution in regard to this point, it is proper to add. The professional witnesses are not to judge of the credit of other wit-

nesses, or of the truth of the facts testified to by them. It is for the jury to decide whether such facts are satisfactorily proved. The question to be put to the professional witnesses is this. If the symptoms and indications testified to by other witnesses are proved, and if the jury are satisfied of the truth of them, whether in their opinion the party was insane, and what was the nature and character of that insanity; what state of mind did they indicate, and what they would expect would be the conduct of such a person in any supposed circumstances?"

REPORT

ON THE

LAW OF REGISTRATION OF BIRTHS, MARRIAGES, AND DEATHS.

BY

EDWARD JARVIS, M.D.,
DORCHESTER, MASSACHUSETTS.

REPORT ON REGISTRATION OF BIRTHS, MARRIAGES, AND DEATHS.

THE Committee appointed at a former session of this Association to consider the subject of registration of births, marriages, and deaths, and to use their influence to cause the same to be adopted by their respective legislatures, were dispersed through all the States of the Union. They have had no meeting, nor, so far as known to the undersigned, any general conference, by correspondence. It is presumed that each should work in his own field, and by means of their varied and separate efforts, they should produce, so far as possible, the desired result, and that finally each should report his own work and his own views of the progress and condition of this great principle of humanity.

In Massachusetts, there was little to be done. The law of registration was adopted in 1842. It was then the revival and amendment of an old law, which, for more than half a century, had been in a varied action and dormancy, and latterly was but little better than dead. The new law went immediately into vigorous and successful operation, and has not slept since. The first report was published in 1843, and its successors have annually appeared until now. The law of 1842 was amended in 1844, and again in 1849, to change its mode of operation somewhat, and give it more efficiency. It needs a still farther improvement to enable it to accomplish its perfect work. Yet, as it is, the reports that are made under it, are more full and complete than any that have thus far been published in the United States; although in respect to fulness and completeness, they fall short of the admirable and instructive reports of the registrar-general of England.

There are now three hundred and thirty-one cities and towns in Massachusetts; all of these now obey the law, in part at least, and make partial or full returns of the births, marriages, and deaths.

Three hundred and twenty-eight of these municipalities last year reported on all of these classes of facts. Of the others, one reported no births, another no marriages, and the third made no return of births or deaths. These negligent towns are small, having in all a population of only 3,565, in 1855.

There are many other towns, whose returns, although they contain all the classes of the required facts, are yet apparently imperfect, and some of them manifestly report only a part of these events, that naturally and necessarily must have happened within their borders in the year. Their officers seem to have been passive, and recorded only such of these matters as they happened to hear of, and to have taken no active measures to search out and obtain the whole.

But this law is growing more and more into popular favor, and commanding a more and more thorough obedience. The people at large, and the general and local authorities are becoming more desirous of its execution, and more interested in its principles and results. Both the classes of delinquent and negligent towns, which made no returns, or imperfect reports, have been gradually decreasing from the beginning until the last year, when none failed entirely, and more than half of the towns, containing two-thirds of the inhabitants, made returns of these facts, which, being compared with their population and with the law that usually governs these events, gave evidence of completeness, and are reliable as a basis of calculation for the expectation of life and the law of mortality.

In 1855 and 1856, and again in 1858, the Massachusetts Medical Society petitioned the legislature to amend this law, and make it more stringent, and require the Secretary of State to compel the local officers, the city and town clerks, to make more full reports, and also to require these clerks to compel those who should report the facts to them, to do so with more certainty and completeness. This proposition failed, and we are yet acting under the old law, with a yearly improvement however, in its operation.

The division of this and of most of the northern States into small towns, and the organization of these municipalities, with local officers, who are acquainted with, or may be able to reach and know, every family within their respective districts, afford an available and satisfactory means and machinery for the execution of this system.

The law of Massachusetts requires the Secretary of State to prepare three sets of blank forms or sheets, for recording severally the

births, the marriages, and the deaths. These sheets are ruled with distinct columns for each of the facts which are to be reported.

One-half of these sheets are bound in distinct volumes, and the others are unbound. The volumes of each of the three kinds and the loose sheets are sent to each of the cities and towns in the State, and the clerks record both in the volumes and on the loose sheets, all the facts which are required by the law, in respect to the births, marriages, and deaths.

The town and city clerks are required to ascertain, by personal inquiry, or otherwise, the name, surname and sex of each child born in the town, the name and surname of both parents of the child, and their residence, the occupation of the father, date, and place of birth.

Every minister and magistrate who shall officiate at any marriage, is required to record and report to the town clerk the date and place of the marriage, the names and surnames of the parties, the residence, age and civil condition of each, the occupation of the groom, the names of their parents, and the name, residence, and official station of the person who performs the ceremony.

Every sexton or undertaker, authorized to bury the dead, is required to record in a book and to report to the town or city clerk, in respect to each person deceased and buried under his care, the name and surname, the sex, age, occupation, condition, whether single, married or widowed, place of death, birthplace, names of parents, place, date and cause of death, and date of record. None but such as are authorized are allowed to bury the dead.

The city and town clerks are required to make duplicate records of all these facts, and also the date when he makes this record of each, in the bound volume and in the sheets, as before described. He sends the copy on sheets to the Secretary of State, and preserves the volume in his own office. All the sheets thus received from the several cities and towns, by the Secretary, are bound together, and both of these copies, at home and in the government office, are preserved and open for public inspection.

The Secretary of State, in each year, employs some skilful physician, learned in these matters, to digest and arrange these facts into tables, and prepare such deductions and observations as may make them the most useful to the people. Dr. Josiah Curtis, an eminent statistician, had the charge of the reports for 1848, 1849, 1850 and 1851, and also has now charge of that for 1857, and Dr.

Nathaniel B. Shurtleff, a scholar of rare acquirement and historical research, has had the charge of the intervening reports.

The documents produced by these gentlemen are very valuable and highly useful to the world at large, and especially to the student of the law of population and mortality, and they are important contributions to the science of life. They now make annual volumes of over two hundred pages; the last covers nearly three hundred pages.

Massachusetts was the pioneer in this undertaking in this country, and now only needs to continue in the way of improvement and perfect the work she has begun, and make her reports a complete record of all these facts that annually occur within her borders. By this means, she will show the rate of mortality and the progress of population, and furnish ground for a good estimate of the value of life, and the causes and the danger of death in her several districts.

When it shall be obtainable, it will be well to have a registrar-general in this as well as in every other State—an officer exclusively devoted to this most important interest of the people—who should give his whole time and thoughts to the inquiry as to the sanitary condition and the endemic influences of the various parts of the State; the value of life, the dangers that beset it, and the chances of death. It seems as reasonable that there should be an officer for these great and vital interests of humanity, as that there should be one exclusively to watch over the interests of agriculture—the growth, development, and preservation of cattle, sheep, swine, &c. This last we now have, a gentleman of the highest order of talent and respectability, and he is paid correspondingly; and we doubt not that our legislature will, in course of time, see the wisdom of watching over men, as well as over farms and cattle, and establish and support an officer for that high and useful purpose. This would tend, more than any other means, to give our present law its full and efficient operation, secure a complete record of all the facts now required, relative to the births, marriages, and deaths, and send forth instructive and valuable reports for the guidance of the people in their self-management.

In the winter of 1856–7, the legislature of Vermont, after a very long and careful deliberation, established this system, and placed the execution of the law in the hands of competent officers, who are now at work preparing the first report.

The establishment of this system throughout the nation must be

a work of time, and of slow progress. It must be accomplished, in State after State, each by the efforts of its own people, and in its own way.

The National Medical Association may very properly recommend the adoption of this measure by all the State governments. It may enjoin it upon all its members to use their utmost influence, and urge it upon all other physicians, upon philanthropists, statesmen, political economists, politicians, and men of influence in their several States to persuade their respective legislatures to create a law for this purpose.

It is proper to propose that there should be a uniformity in the principles to be adopted, and the results to be obtained. In all, the government should obtain and publish the record of the births, marriages, and deaths, and the principal circumstances attending each, and these should be arranged and printed in such form and manner, and such deductions drawn, as will aid in setting forth the sanitary condition of the people, the progress of population, and the law of mortality in each State.

As the internal organization and domestic and local administration of the several States differ very widely, it is both unwise to recommend, and impossible to adopt, any uniform plan, for the gathering of these facts, which would be suitable for all. But each State must form a plan suited to its own circumstances, and use for this purpose the means they have, and the machinery already in operation for other purposes, but which may be made available for this. In the present state of public opinion, and general estimate of sanitary science, it will be useless to ask any legislature to create any new machinery exclusively for this work, or even to try to keep it in operation, if it should be created. Even in Massachusetts, the proposition to create the office of registrar-general, at the request of the medical society, was opposed by men whose sympathies were supposed to be with the progress of improvement, and it has been voted down by four or five different legislatures.

Yet the city and town organizations, with their usual officers, answer a very good purpose, and through them the facts can be mostly obtained; the Secretary of State very wisely delegates men of high intelligence and of scientific acquirement to do this work of preparing the reports, which finds an unnatural juxtaposition with the multifarious affairs of his department. The same is usually done in Rhode Island, Vermont, Connecticut, and New Jersey, and the same, I think, is proposed in Maine, and perhaps in Michi-

gan, and this is the best that can be done at present, in these States, at least, and probably in others.

The town organization and the local municipal officers may be used, and should be depended upon for the execution of the registration law, where they already exist. But, in other States which are not so divided and organized, and where the smallest divisions are counties and parishes, some other means must be resorted to. Yet, even these large divisions, and the authorities connected with them, may be rendered available for our present purpose.

In every State there is some system, or some arm of the government that is made to reach every family within its borders, for the purposes of taxation, police, &c. Every house, dwelling, and householder, is under the inspection of some of the officers of the law, and their condition, in some measure, made known. This omnipresent arm of the government may be used to grasp at facts, as well as money, and the same officers that assess and collect the public dues, may collect the record of the domestic events of births, marriages and mortality.

This is well shown in the example of Kentucky, which is divided into one hundred and four counties, but not into towns. In that State, the county assessors of taxes are required to obtain the births, marriages, and deaths, and report them to the central officer at Frankfort. The excellent reports which have now for five years been prepared by Dr. William L. Sutton, and published by the State government, prove that, in Kentucky, at least, the county organization affords a very good substitute for towns, where they do not exist, and we doubt not, the same may be found in other States, if they will but try the experiment.

It would, therefore, seem advisable for this Association again to recommend this matter to the vigilant care of all its members, and to urge them to use all their influence at home for the establishment of a registration law in their respective States; and this should be repeated at every annual session of this body, until every State shall have adopted the system, and all these three great events of human life, with their attendant circumstances which may occur within our nation, shall be recorded and published, according to some uniform plan, which may be here adopted.

As far as possible, the same facts, connected with these events, should be obtained from the people, and these should be digested and arranged in the same form, and presented in similar tables, and the deaths in the same nosological nomenclature. It is not to be

supposed that the first can be done, at once, in any State just entering upon the work. It may not be expedient to ask, nor possible to obtain, answers to as many questions from a people who are unused to the operation of the law, as from a community long accustomed to it.

It would be well, then, for this Association to determine what events or facts connected with birth, marriage, and death, it is desirable to obtain, and to arrange these in the order of their importance. Then each State can incorporate as many of these into its law, as the people can be persuaded to report. Afterward, more and more can be added to the requirements, as the people become more willing to report them, until the measure of this knowledge shall be full.

Perhaps this order of facts would be the best:—

BIRTHS.	MARRIAGES.	DEATHS.
1. Name and surname.	1. Names of parties in full.	1. Name and surname.
2. Sex.	2. Date and place.	2. Sex.
3. Date of birth.	3. Residence of parties.	3. Date.
4. Names of parents.	4. Officiating clergyman, or magistrate.	4. Place of death.
5. Residence of parents.	5. Occupation of groom.	5. Cause of death.
6. Occupation of "	6. Age of both parties.	6. Birthplace.
7. Nativity, State, or country of "	7. Civil condition, single, divorced, or widowed of parties.	7. Occupation, if adult.
	8. Parents of parties.	8. Civil condition, single, married, or widowed.
	9. Nativity of parties.	9. Parents, if child.
		10. Occupation of parents.
		11. Place of burial.

The difference in the facts required and obtained, must make some difference in the tabulation and presentation of the results; but there need be no variation in the nosology in which all the causes of mortality should be arranged. One system, for this purpose, should be recommended by this Society, and adopted by all the States. This will render all the reports the most available for comparison, and for combined usefulness in any national purpose.

A nosology was adopted by this Association in 1847, and still stands as the one approved. This has since been revised, under the authority, and at the request of the census office of the United States, and published in the mortality volume of the national census for 1850, pages 17 to 28. This was prepared with great care, from an examination and comparison of the nosology adopted by this Society, and of those used by Massachusetts, and other States,

and some cities in America, and those now and formerly in use by the registrar-general of England and Wales.

It is probable that no better system could now be adopted, unless the diseases of mumps and congestive fever should be added to the causes of death. A larger extent of diseases would render the arrangement, classification, and tabulation, more difficult, and less available. It would be possible to include all the causes of mortality under these heads, and it is not desirable that they should be increased.

Notwithstanding this is deemed to be the best system of classification of diseases, there is yet the consideration of uniformity of plan, which, for all purposes of comparison, of investigation, and tracing out principles based upon the broadest foundation, is of very great importance, and perhaps even of greater moment than the kind of arrangement that may be adopted. At the world's statistical congress, held at Brussels, in Belgium, this matter was taken up and referred to a committee, which included Dr. Farr, of London, and M. D'Espine, of Switzerland, two of the most learned and reliable nosologists of the age. They differed in opinion as to the arrangement, and reported two different systems of classification. Dr. Farr's was adopted by the registrar-general of England, and is now in use there. It is also adopted in Massachusetts, and the reports are arranged according to it.

As England has taken the lead in this great work, and considering the extent of her population, and the fulness and amount of learning embodied in her accurate reports, she must take the lead in this matter for many years to come; it is worth our consideration whether it would not be better to adopt Dr. Farr's system of classification for the American States, although, looking to its merits alone, it may be inferior to that already in use here.

I therefore append a copy of the late English system to this report, for the consideration of the Association.

Having determined that the system of registration ought to be adopted by all of our States, and what facts should be gathered, and in what classification they should be presented to the world, the several States should be encouraged to use such means and machinery for effecting this purpose, as their respective conditions and organizations may present to them as the most available in their hands. Here we must expect no uniformity, and none is needed; provided the facts are gathered, and the work is done. The great events of life, with their attendant circumstances, are recorded and reported,

and their lessons are taught to the world, it matters not by what means they are ascertained.

As now this system is well established and in operation, in Kentucky, South Carolina, Virginia, New Jersey, Connecticut, Rhode Island, Massachusetts and Vermont, eight States, and as Maine and Michigan have taken the preliminary steps for this purpose, and men of science, and even politicians, are using their influence in other States for this object, there is much reason to believe, that their example will be followed, and that State after State will, in the progress of time, follow in the same path, until finally, and, we trust, at no distant period, the system will be adopted, and this record of life and death be made complete, throughout our nation.

It will be necessary for this purpose that the Association bodily, and all its members individually, should, publicly and privately, at home and everywhere, use their influence unceasingly, until the whole is accomplished. Respectfully submitted.

EDWARD JARVIS, M. D.,
One of the Committee on Registration.

DORCHESTER, MASSACHUSETTS, *April 25th*, 1858.

Nosology for the Mortality of 1850. *Prepared from Mr. De Bow's List of Diseases for the use of the Census Department of the United States.* By EDWARD JARVIS. September, 1855.

1. Abscess.
2. Accident (including killed, and all others "not specified").
3. " Burns and Scalds.
4. " Explosion, steam.
5. " " powder.
6. " Railroad.
7. " Drowning.
8. Anæmia.
9. Aneurism.
10. Apoplexy (including "Congestion of Brain").
11. Asthma.

12. Bladder, disease of.
13. Bones, disease of.
14. Brain and Nervous System, disease of.
15. Bronchitis (including "Catarrh," and "Catarrhal Fever").

16. Cancer.
17. Carbuncle.
18. Cephalitis (including "Inflammation of Brain," and "Brain Fever").
19. Child-birth (including "Milk Leg").
20. Cholera.
21. " Infantum (including "Summer Complaint" of Infants).
22. " Morbus (including "Summer Complaint" of older persons).
23. Chorea.
24. Circulatory Organs, disease of.
25. Cold Water Drinking.
26. Colic (including "Cramp," if of stomach).
27. Consumption.
28. Convulsions.
29. Croup (including "Hives," where is any evidence of Dis. of Throat).
30. Debility (including all ages, and also "Premature Birth").
31. Delirium Tremens ("Mania-a-Potu").
32. Diabetes.
33. Diarrhœa.
34. Digestive Organs, disease of (including "Bowels, Dis. of," and "Stomach, Dis. of").
35. Dirt-Eating (Negro Cachexia).
36. Dropsy.
37. Dysentery.
38. Dyspepsia.

39. Enteritis ("Inflam. of Bowels").
40. Epilepsy.
41. Erysipelas.
42. Executed.

43. Fever (including all Fevers not specified; and also "Bilious," and "Gastric" Fevers).
44. " Congestive.
45. " Intermittent.
46. " Puerperal.
47. " Remittent.
48. " Scarlet (including "Canker," "Canker Rash," and "Putrid Sore-Throat").
49. " Ship.
50. " Typhus (including "Inflammatory Fevers").
51. " Yellow.
52. Fistula.
53. Fracture.
54. Frozen.

55. Gastritis ("Inflam. of Stomach").
56. Generative Organs, disease of (including "Fluor Albus," "Menses suppressed," "Uterus, Dis. of").
57. Gout.
58. Gravel.

59. Hemorrhage.

60. Hæmorrhoids.
61. Heart, disease of.
62. Heat (including "Sunstroke").
63. Hernia.
64. Hip, disease of.
65. Hooping-cough.
66. Hydrocephalus.
67. Hydrophobia.
68. Infantile (this should include only those who die from want of sufficient vital force from birth; but it is used for many kinds of diseases of infancy, and in fact it conveys nothing more than *Diseases of Infancy*).
69. Inflammation.
70. Influenza.
71. Insanity.
72. Intemperance.
73. Jaundice.
74. Joints, disease of.
75. Kidneys, disease of.
76. Laryngitis (including "Inflammation of Throat," and "Dis. of Throat").
77. Leprosy.
78. Lightning.
79. Liver, disease of.
80. Malformation.
81. Marasmus (including "Atrophy," and "Tabes Mesenterica").
82. Measles.
83. Mercury, effects of (including "Salivation").
84. Milk Sickness.
85. Mortification.
86. Mumps.
87. Murder.
88. Neuralgia.
89. Old Age.
90. Paralysis.
91. Paramenia (including "Diseases of Menstruation," and "Chlorosis").
92. Peritonitis.
93. Pleurisy.
94. Pneumonia (including "Inflammation of Lungs," and "Winter Fever" of the South and West).
95. Poison.
96. Quinsy.
97. Respiratory Organs, disease of (including "Dis. of Lungs").
98. Rheumatism.
99. Rickets.
100. Scrofula.
101. Scurvy.
102. Skin, disease of.
103. Smallpox.
104. Spine, disease of (including "Lumbar Abscess").
105. Starvation.
106. Stillborn.
107. Suffocation.
108. Suicide.
109. Syphilis (including "Venereal").
110. Teething.
111. Tetanus (including "Lockjaw," and "Cramp," if of "Muscles").
112. Thrush.
113. Tumor.
114. Ulcer.
115. Unknown.
116. White Swelling.
117. Worms.

Nosological Classification.

I. Zymotic Diseases.
Endemic. Epidemic. Contagious.
Sporadic Diseases.
II. Diseases of Uncertain and variable seat.
III. " of the Brain and Nervous System.
IV. " of the Respiratory Organs.
V. " of the Circulatory Organs.
VI. " of the Digestive Organs.
VII. " of the Urinary Organs.
VIII. " of the Generative Organs and Childbirth.
IX. " of the Locomotive Organs.
X. " of the Skin.
XI. Old Age.
XII. External Causes.
Stillborn, Unknown, or Causes not stated or specified.

I. Zymotic Diseases.

1. Cholera.
2. " Infantum.
3. " Morbus.
4. Croup.
5. Diarrhœa.
6. Dysentery.
7. Erysipelas.
8. Fever.
9. " Congestive.
10. " Intermittent.
11. " Remittent.
12. " Scarlet.
13. " Ship.
14. " Typhus.
15. " Yellow.
16. Hooping-Cough.
17. Influenza.
18. Measles.
19. Mumps.
20. Smallpox.
21. Syphilis.
22. Thrush.

II. Diseases of Uncertain Seat.

23. Abscess.
24. Cancer.
25. Debility.
26. Dropsy.
27. Gout.
28. Hemorrhage.
29. Infantile.
30. Inflammation.
31. Malformation.
32. Marasmus.
33. Milk Sickness.
34. Mortification.
35. Rickets.
36. Scrofula.
37. Scurvy.
38. Tumor.

III. Diseases of the Brain and Nervous System.

39. Apoplexy.
40. Brain and Nerves, disease of.
41. Cephalitis.
42. Chorea.
43. Convulsions.
44. Delirium Tremens.
45. Epilepsy.
46. Hydrocephalus.
47. Insanity.
48. Neuralgia.
49. Paralysis.
50. Tetanus.

IV. Diseases of the Respiratory Organs.

51. Asthma.
52. Bronchitis.
53. Consumption.
54. Laryngitis.
55. Pleurisy.
56. Pneumonia.
57. Quinsy.
58. Respiratory Organs, dis. of.

V. Diseases of the Circulatory Organs.

59. Anæmia.
60. Aneurism.
61. Circulatory Organs, dis. of.
62. Heart, disease of.

VI. Diseases of the Digestive Organs.

63. Colic.
64. Digestive Organs, disease of.
65. Dirt Eating.
66. Dyspepsia.
67. Enteritis.
68. Gastritis.
69. Hæmorrhoids.
70. Hernia.
71. Jaundice.
72. Liver, disease of.
73. Peritonitis.
74. Teething.
75. Worms.

VII. Diseases of the Urinary Organs.

76. Bladder, disease of.
77. Diabetes.
78. Gravel.
79. Kidneys, disease of.

VIII. Diseases of the Generative Organs and Childbirth.

80. Childbirth.
81. Generative Organs, disease of.
82. Paramenia.
83. Puerperal Fever.

IX. Diseases of the Locomotive Organs.

84. Bones, disease of.
85. Hip, disease of.
86. Joints, disease of.
87. Rheumatism.
88. Spine, disease of.
89. White Swelling.

X. Diseases of the Skin.

90. Carbuncle.
91. Fistula.
92. Leprosy.
93. Skin, disease of.
94. Ulcer.

XI. Old Age.

95. Old Age.

XII. External Causes.

96. Accident.
97. " Burns and Scalds.
98. " Drowning.
99. " Explosion, steam.
100. " " powder
101. " Railroad.
102. Cold Water Drinking.
103. Executed.
104. Fracture.
105. Frozen.
106. Heat.
107. Hydrophobia.
108. Intemperance.
109. Lightning.
110. Mercury, effects of.
111. Murder.
112. Poison.
113. Starvation.
114. Suffocation.
115. Suicide.

XIII.

116. Stillborn.

XIV.

117. Unknown.

CLASSIFICATION AND NOMENCLATURE OF DISEASES,

RECOMMENDED FOR USE IN THE REGISTRY OF BIRTHS, MARRIAGES, AND DEATHS.

THE following classification of the Causes of Death is prepared by William Farr, Esq., M. D., of London, and is recommended by the best medical authorities of Great Britain, Ireland and Germany. It is adopted and used by the Registration officers of England, Scotland, and Massachusetts. It is printed at length with explanatory remarks in the Sixteenth Report of the Registrar-General of England, and also in his letter of instructions to the local Registrars. It is found in the 14th and 15th Reports of Massachusetts, and in the Secretary's letter to the town and city clerks.

CLASSES.

I.—ZYMOTIC DISEASES: *Zymotici.* (ζύμη, leaven.)
Diseases that are either epidemic, endemic, or contagious; induced by some specific body, by the want of proper nourishment, or by the bad quality of food.

II.—CONSTITUTIONAL DISEASES: *Cachectici.* (καχεξία, bad habit of body.)
Sporadic diseases; affecting several organs in which new morbid products are often deposited; sometimes hereditary.

III.—LOCAL DISEASES: *Mŏnorganici.* (μόνος, alone, without others; ὄργανον, organ.)
Sporadic diseases in which the functions of particular organs or systems are disturbed or obliterated, with or without *inflammation;* sometimes hereditary.

IV.—DEVELOPMENTAL DISEASES: *Metamorphici.* (μεταμόρφωσις, change of form.)
Special diseases, the incidental result of the formative, reproductive, and nutritive processes.

V.—VIOLENT DISEASES OR DEATHS: *Thanatici.* (θάνατοι, violent deaths.)
Diseases which are the evident and direct results of physical or chemical forces, acting either by the will of the sufferer, of other persons, or accidentally.

ORDERS.

Class I.—Order 1. Miasmatic diseases: Miasmatici. (μίασμα, stain; defilement.)
2. Enthetic diseases: Enthetici. (ἐνθετος, put in; implanted.)
3. Dietic diseases: Dietici. (δίαιτα, way of life; diet.)
4. Parasitic diseases: Parasitici. (παράσιτος, parasite.)

Class II.—Order 1. Diathetic diseases: Diathetici. (διάθεσις, condition; diathesis.)
2. Tubercular diseases: Phthisici. (φθίσις, wasting away.)

Class III.—Order 1. Brain diseases: Cephalici. (κεφαλή, head.)
2. Heart diseases: Cardiaci. (καρδία, heart.)
3. Lung diseases: Pneumonici. (πνεύμων, lung.)
4. Bowel diseases: Enterici. (ἔντερον, intestine.)
5. Kidney diseases: Nephritici. (νεφρός, kidney.)
6. Genetic diseases: Aidoici. (αἰδοῖα, pudenda.)
7. Bone and Muscle diseases: Myostici. (μῦς, muscle; ὀστέον, bone.)
8. Skin diseases: Chrotici. (χρώς, skin.)

Class IV.—Order 1. Developmental diseases of children: Paidiaci. (παιδία, youth.)
2. Developmental diseases of women: Gyniaci. (γυνή, woman.)
3. Developmental diseases of old people: Geratici. (γῆρας, old age.)
4. Diseases of nutrition: Atrophici. (ἀτροφία, atrophy.)

Class V.—Order 1. Accident: Tychici. (τύχη, chance.)
2. Battle: Polemici. (πόλεμος, battle; fight.)
3. Homicide: Androphonici. (ἀνήρ, man; φονεύω, I kill.)
4. Suicide: Autophonici. (αὐτός, self; φονεύω, I kill.)
5. Execution: Demiotici. (δημιώτης, executioner.)

[*** The names of such of the following diseases as are printed in small capitals are sufficient for statistical tables of the Causes of Death.]

CLASS I. ZYMOTIC DISEASES.—*Zymotici.*

ORDER I.—*Miasmatici.*

SMALLPOX, *variola.*
Varioloid, *varioloides.*
Chicken-pox, *varicella.*
Miliaria.
MEASLES, *morbilli.*
SCARLATINA.
(a.) Angina maligna, classed with scarlatina.
QUINSY, *tonsillia, tonsillitis.*
Diphtheria.
Mumps, *parotia, parotitis.*
CROUP, *trachealia, cynanche trachealis.*
HOOPING-COUGH, *pertussis.*
Typhoid Fever, *febris typhoides.*
Relapsing Fever, *febris recurrens.*
TYPHUS.
ERYSIPELAS.
Erythema.
Pyemia.
Hospital Gangrene, *gangrena nosocomialis.*
METRIA, *febris puerperarum.*
Pestis, plague, *pestis.*
CARBUNCLE, *anthrax.*
Boil, *furunculus.*
INFLUENZA.
Including the epidemic pleurisy and pneumonia.
DYSENTERY, *dysenteria.*
DIARRHŒA.
CHOLERA.
Yellow Fever, *typhus icterodes.*
AGUE, *febris intermittens.*
REMITTENT FEVER, *febris remittens.*
(Hong Kong and other fevers, *febris tropicorum.*)
RHEUMATISM, *rheumatismus acutus.*

ORDER II.—*Enthetici.*

SYPHILIS, primary, *syphilis primarius.*
Syphilis, secondary, *syphilis secundarius.*
Gonorrhœa.
Leprosy, *lepra.*
(Including Greek elephantiasis.)
Purulent Ophthalmia, *ophthalmia purulenta.*

Glanders, *equinia.*
HYDROPHOBIA, *rabies.*
NECUSIA.
(Infection by puncture in dissection.)
Malignant Pustule, *pustula maligna.*

ORDER III.—*Dietici.*

FAMINE FEVER, *febris à fame.*
Scurvy, *scorbutus.*
PURPURA.
Rickets, *rachitis.*
Bronchocele.
Cretinism, *cretinismus.*
Ergotism, *ergotismus.*
ALCOHOLISM, *alcoholismus.*
(Includes intemperance, delirium tremens, and catacausis.)

ORDER IV.—*Parasitici.*

THRUSH, *aphtha.*
Porrigo.
Scabies.
Phthiriasis, *morbus pedicularis.*
WORMS, *vermes.*
(a.) Hydatids, *acephalocystis, echinococcus hominis.*
(b.) Tape Worm, *tænia solium.*
(c.) Strongylus Gigas.
(d.) Round Worm, *ascaris lumbricoides.*
(e.) Thread Worm, *ascaris vermicularis.*
(f.) Guinea Worm, *draeunculus.*

CLASS II. CONSTITUTIONAL DISEASES.—*Cachectici.*

ORDER I.—*Diathetici.*

GOUT, *podagra.*
Anæmia.
DROPSY, *hydrops.*
CANCER (soft), *carcinoma encephaloides.*
Cancer (colloid), *carcinoma alveolare.*
Cancer (osteoid), *carcinoma osteoides.*
Cancer (scirrhus), *scirrhoma.*
Cancer (epithelial), *carcinoma epitheliale.*
(Sweep's Cancer, &c.)
Melanosis.
Lupus.
CANKER, *noma.*
MORTIFICATION, *gangræna.*
Dry Gangrene, *gangræna senilis.*
Bed Sore.
(Refer hemorrhage, abscess, ulcer, tumor, to the organs affected.)

ORDER II.—*Phthisici.*

SCROFULA.
(a.) (Psoas abscess, *abscessus psoanus.*)
White Swelling.
TUBERCULOSIS MESENTERICA.
Tubercular Peritonitis.
PHTHISIS.
(Hæmoptysis.)
HYDROCEPHALUS.
(With tubercular deposit.)

CLASS III. LOCAL DISEASES.—*Monorganici.*

ORDER I.—*Cephalici.*

Meningitis.
Encephalitis.
(Including acute hydrocephalus.
CEPHALITIS.
Myelitis.
APOPLEXY, *apoplexia.*
PARALYSIS of ——.
Shaking palsy, *paralysis agitans.*
CHOREA.
DELIRIUM TREMENS.
INSANITY.
Monomania.
Dementia.
EPILEPSY, *epilepsia.*
Hysteria.
TETANUS.
CONVULSIONS, *convulsio, eclampsia.*
Laryngismus.
Neuralgia. (Tic douloureux.)
Neuroma.
Ophthalmitis.
Blindness, *cæcitas.*
Otitis.
Deafness, *surditas.*
DISEASE OF BRAIN, &c.

ORDER II.—*Cardiaci.*

Carditis.
PERICARDITIS.
Endocarditis.
DISEASE OF HEART VALVES, *morbus cordis valvularum.*
Heart Hypertrophy, *hypertrophia cordis.*
Heart Atrophy, *atrophia cordis.*
Heart, fatty degeneration, *cordis degeneratio.*
ANEURISM OF THE HEART, *aneurisma cordis.*
Aneurism of the Aorta, popliteal artery, &c., *aneurisma aortæ, &c.*
Angina Pectoris.
Fainting, *syncope.*
Arteritis.
Atheroma of Arteries, *atheroma arteriarum.*
Phlebitis.
Varicose Veins, *varix.*

ORDER III.—*Pneumonici.*

Epistaxis.
LARYNGITIS.
(Œdema of the glottis, *œdema glottidis.*)
Laryngismus Stridulus.
BRONCHITIS.
PLEURISY, *pleuritis.*
Hydrothorax.
Empyema.
Pneumothorax.
Congestion of Lungs, *apoplexia pulmonalis.*
PNEUMONIA.
Pleuripneumonitis.
ASTHMA.
(Emphysema of lungs, *emphysema.*)
Grinder's asthma, *asthma tritorum.*
Miner's asthma, } *asthma metallicorum.*
Spurious Melanosis, }

ORDER IV.—*Enterici.*

Glossitis.
Stomatitis.
Pharyngitis.
Œsophagitis.
GASTRITIS.
ENTERITIS.
PERITONITIS.
ILEUS.
Constipation, *constipatio.*
INTUSSUSCEPTION, *intussusceptio.*
HERNIA.
Hernia (congenital), *congenitalis.*
Hernia (femoral), *femoralis.*
Hernia (inguinal), *inguinalis.*
Hernia (scrotal), *scrotalis.*
Hernia (umbilical), *umbilicalis.*
Hernia (ventral), *ventralis.*
STRICTURE OF ILEUM, &c., *contractura ilii, &c.*
Perforation of Ileum, &c., *perforatio ilii, &c.*
ULCERATION OF ILEUM, &c., *ulcus ilii.*
Dyspepsia.
Pyrosis.
Gastralgia.
Hæmatemesis.
Melæna.
Hæmorrhoids, *hæmorrhois.*
FISTULA.
PANCREATIC DISEASE, *morbus pancreaticus.*
SPLENITIS.
HEPATITIS.
JAUNDICE, *icterus.*
Gallstones, *chololithus.*
Cirrhosis.
ASCITES.

ORDER V.—*Nephritici.*

NEPHRITIS.
ISCHURIA.
Diuresis.
NEPHRIA.
(Bright's disease, *albuminuria.*)
DIABETES.
STONE, *calculus.*
(Uric acid, &c.)
Gravel, *calculus.*
Hæmaturia.
CYSTITIS.
Disease of the Prostate Gland, *morbus prostaticus.*
CONTRACTURA URETHRÆ.

ORDER VI.—*Genetici.*

Varicocele.
Orchitis.

Hydrocele.
Hysteritis.
OVARIAN DROPSY, *hydrops ovarii.*
OVARIAN TUMOR, *tumor ovarii.*
Uterine Tumor, *tumor uteri.*
Polypus of Uterus, *polypus uteri.*

ORDER VII.—*Myostici.*

SYNOVITIS.
Ostitis (including periostitis and endostitis).
Exostosis.
Brittle Bones, *fragilitas ossium.*
Soft Bones, *mollities ossium.*
Curvature of spine, *curvatura spinæ.*
Caries.
NECROSIS.
Muscular Atrophy, *atrophia musculorum.*

ORDER VIII.—*Chrotici.*

Roseola.
Urticaria.
Eczema.
Herpes.
Pemphigus.
Rupia.
Ecthyma.
Impetigo.
Acne.
Mentagra.
Lichen.
Prurigo.
Psoriasis.
Pityriasis.
Ichthyosis.
PHLEGMON.
Whitlow, *paronychia.*
Abscess (external), *abscessus externus.*

CLASS IV. DEVELOPMENTAL DISEASES.—*Metamorphici.*

ORDER I.—*Developmental Diseases of Children: Paidiaci.*

STILLBORN, *natus mortuus.*
PREMATURE BIRTH, *prematurè natus.*
Atelectasis, *atelectasis pulmonum.*
Malformations, *vitia conformationis.*
CYANOSIS.
SPINA BIFIDA.
ANUS IMPERFORATUS.
Idiocy, *fatuitas.*
Congenital Deaf-dumbness, *mutitas.*
TEETHING, *dentitio.*

ORDER II.—*Developmental Diseases of Women, chiefly in the Reproductive Age: Gyniaci.*

Chlorosis.
CHILDBIRTH, miscarriage, abortion, *partus, abortus.*
PARAMENIA, including amenorrhœa, and leucorrhœa.
Climacteria. (Turn of life.)

ORDER III.—*Developmental Diseases of Old People: Geratici.*

OLD AGE, *senectus.*

ORDER IV.—*Diseases of Nutrition: Atrophici.*

ATROPHY, DEBILITY, including premature old age, *atrophia, asthenia.*

CLASS V. VIOLENT DEATHS OR DISEASES.—*Thanatici.*

ORDER I.—*Accident: Tychici.*

BURN, SCALD, *ambustio.*
EXPLOSION of powder, gas, &c., *explosio.*
FROST, *gelatio.*
LIGHTNING, *fulmen.*
SUNSTROKE, *insolatio.*
DROWNING, *submersio.*
HANGING, *suspendium.*
Suffocation, *suffocatio.*
Fracture of ——, *fractura* —.
Contusion of ——, *contusio* —.
Concussion of ——, *commotio* —.
Gunshot Wound, *vulnus a tormento.*
Cut; stab, *vulnus cultro; sicâ.*
POISONING, *venenatio.*
Privation, *privatio.*
Otherwise.

ORDER II.—*Battle: Polemici.*

On the field, *in pugnâ terrestri.*
Gunshot Wound, *vulnus a tormento.*
Cut; stab, *vulnus gladio; pugione.*
Otherwise.
Naval engagement, *in pugnâ navali.*
After land fight, *post pugnam terrestrem.*
After sea fight, *post pugnam navalem.*
(Showing the nature of the wound.)

ORDER III.—*Homicide: Androphonici.*

Burn, scald, *ambustio.*
Drowning, *submersio.*
Suffocation, *suffocatio.*
Fracture of ——, *fractura* —.
Blow on ——, *ictus* —.
Contusion of ——, *contusio* —.
Concussion of ——, *concussio* —.
Gunshot Wound, *vulnus a tormento.*
Cut; stab, *vulnus cultro; sicâ.*
Poisoning, *venenatio.*
Privation, *privatio.*
Otherwise.
(Duel, murder, &c., to be noted.)

ORDER IV.—*Suicide: Autophonici.*

Burn, *ambustio.*
Drowning, *submersio.*
Hanging, *suspendium.*
Suffocation, *suffocatio.*
Fracture, &c., *fractura, &c.*
Gunshot Wound, *vulnus a tormento.*
Cut; stab, *vulnus cultro; sicâ.*
Poison by ——, *venenatio.*
Privation, *privatio.*

ORDER V.—*Execution: Demiotici.*

Gunshot Wound, *vulnus a tormento.*
Hanging, *suspendium.*
Otherwise.

The Secretary of State of Massachusetts, in his letter to the clerks, very properly adds:—

"The preceding list of diseases is sufficiently minute for all practical purposes, and should be followed as strictly as possible by those who collect statistical facts for registration. Perhaps in some cases more particularity might be necessary and could easily be given. In such instances it would be well for the persons who keep records to enter more at large the causes of death and any extraordinary circumstances attending them.

"Under no circumstances should carbuncle, worms, dropsy, cancer, canker, mortification, convulsions, aneurism, hernia, malformation, exostosis, necrosis, abscess, &c., be set down as the causes of death without a much greater particularity. For instance, with the local causes there should be given the special part affected; and with the others there should be also given some positive characteristic by which the disease could be easily classed. No clerk or registrar should consider any cause of death recorded satisfactorily that he cannot easily and without doubt classify.

"For the purpose of tabulation only, a less formidable list of causes may be used, than that on the preceding pages; but this should not prevent the keeping of perfect records by the registering officers." A list of causes of death, sufficient for statistical purposes, will be found on pages 546 and 547 of this volume.

STATISTICAL NOSOLOGY.

The following list exhibits the principal causes of death, classified and arranged in the order in which they have been considered proper for statistical purposes. It comprises causes which, in the preceding list, are distinguished by being printed in small capitals, and with which all others should, in the process of tabulation, be incorporated.

I. ZYMOTIC.
II. CONSTITUTIONAL.
III. LOCAL.
IV. DEVELOPMENTAL.
V. VIOLENT.

I.—1. MIASMATIC.
2. ENTHETIC.
3. DIETIC.
4. PARASITIC.

II.—1. DIATHETIC.
2. TUBERCULAR.

Diseases of the—

III.—1. NERVOUS SYSTEM.
2. ORGANS OF CIRCULATION.
3. RESPIRATORY ORGANS.
4. DIGESTIVE ORGANS.
5. URINARY ORGANS.
6. GENERATIVE ORGANS.
7. ORGANS OF LOCOMOTION.
8. INTEGUMENTARY SYSTEM.

IV.—1. DISEASES OF CHILDREN.
2. DISEASES OF WOMEN.
3. DISEASES OF OLD PEOPLE.
4. DISEASES OF NUTRITION.

V.—1. ACCIDENT.
2. BATTLE.
3. HOMICIDE.
4. SUICIDE.
5. EXECUTION.
6. OTHER VIOLENT CAUSES.
SUDDEN DEATH.
CAUSE NOT STATED (including still-born).

I.—1. MIASMATIC.
Smallpox.
Measles.
Scarlatina.
Quinsy.
Croup.
Hooping-Cough.
Typhus.
Erysipelas.
Metria (puerperal fever).
Carbuncle.
Influenza.
Dysentery.
Diarrhœa.
Cholera.
Cholera Infantum.
Ague.
Remittent Fever.
Rheumatism.

I.—2. ENTHETIC.
Syphilis.
Hydrophobia.
Necusia.

I.—3. DIETIC.
Privation.
Purpura and Scurvy.
Intemperance.

I.—4. PARASITIC.
Thrush.
Worms, &c.

II.—1. DIATHETIC.
Gout.
Dropsy (and anæmia).
Cancer.
Noma (canker).
Mortification.

II.—2. TUBERCULAR.
Scrofula.
Tabes Mesenterica.
Phthisis.
Hydrocephalus.

III.—1. NERVOUS SYSTEM.
Cephalitis.
Apoplexy.
Paralysis.
Delirium Tremens.
Insanity.
Chorea.
Epilepsy.
Tetanus.
Convulsions.
Disease of Brain, &c.

III.—2. ORGANS OF CIRCULATION.
Pericarditis.
Aneurism.
Disease of the Heart, &c.

III.—3. RESPIRATORY ORGANS.
Laryngitis.
Bronchitis.
Pleurisy.
Pneumonia.
Asthma.
Disease of Lungs.

III.—4. DIGESTIVE ORGANS.
Gastritis.
Enteritis.
Peritonitis.
Ascites.
Ulceration of Intestines.
Hernia.
Ileus.
Intussusception.
Stricture of Intestines.
Fistula.
Disease of Stomach, &c.
Disease of Pancreas.
Hepatitis.
Jaundice.
Disease of Liver.
Disease of Spleen.

III.—5. URINARY ORGANS.
Nephritis
Ischuria.
Nephria.
Diabetes.
Calculus (gravel, &c.).
Cystitis.
Stricture of Urethra.
Disease of Kidneys, &c.

III.—6. GENERATIVE ORGANS.
Ovarian Dropsy.
Disease of Uterus, &c.

III.—7. ORGANS OF LOCOMOTION.
Arthritis.
Disease of Joints, &c.

III.—8. INTEGUMENTARY SYSTEM.
Phlegmon.
Ulcer.
Diseases of Skin.

IV.—1. DISEASES OF CHILDREN.
Infantile Debility.
Premature Birth.
Cyanosis.
Spina Bifida.
Other Malformations.
Teething.

IV.—2. DISEASES OF WOMEN.
Paramenia.
Childbirth.

IV.—3. DISEASES OF OLD PEOPLE.
Old Age.

IV.—4. DISEASES OF NUTRITION.
Atrophy and Debility.

V.—1. Accident.
2. Battle.
3. Homicide.
4. Suicide.
5. Execution.
6. Other violent causes.

Sudden Death.
Cause not specified.

REPORT

ON THE

NERVOUS SYSTEM IN FEBRILE DISEASES,

AND THE

CLASSIFICATION OF FEVERS BY THE NERVOUS SYSTEM.

BY

HENRY FRASER CAMPBELL, A.M., M.D.,

PROFESSOR OF ANATOMY IN THE MEDICAL COLLEGE OF GEORGIA.

"There are no false, but many incomplete systems; systems, true in themselves, but vicious in their pretensions, each to comprise that absolute truth which is only found distributed through them all."—VICTOR COUSIN.

Each has seen one side of the Pyramid, and has written beneath it, not as he should, "This is one side of the Pyramid," but "This is the Pyramid."—JOUFFROY.

REPORT ON THE NERVOUS SYSTEM IN FEBRILE DISEASES.

PLATO has defined man, "The hunter of Truth." "Did the Almighty," says Lessing, "holding in his right hand *truth*, and in his left, *search after* truth, graciously design to offer me which I might prefer, in all humility, but without hesitation, I should request *search after truth*." "We exist," says Hamilton, "only as we energize; pleasure is the reflex of unimpeded energy, energy is the means by which our faculties are developed, and a *higher* energy, the end which their development proposes."

With these encouraging dicta before us, we propose to enter an obscure field of investigation, in which perhaps the "search after truth" may in the end prove far more satisfying and improving than the truth itself, which we yet earnestly hope to develop.

To say that the nervous system has not been studied in its relations to disease, and sometimes in its relations to febrile diseases, would be to project a bold, nay, a rash assertion; and to deny that great and valuable progress has been made in this department, would be unwarranted; but on the other hand, to assert that our knowledge is here complete and that opinion is established, would be equally false and unwarrantable. The nervous system has long been recognized as being deeply implicated in all the phenomena of the living being, both in states of health and of disease, and among these latter states, the important condition of the organism presented by fevers, has fully arrested the attention of the more philosophic and observing of the profession. Ever since when in the beginning of the seventeenth century, and perhaps earlier, medical philosophers began to have definite opinions about the physiological relations of nervous matter to the phenomena of life, we find here and there an occasional glimpse of the idea that, in a state of disease, no less than in a condition of health, this same

nervous matter maintains a pertinent and significant relation to the observed phenomena; and when, at perhaps a later time, the splendid researches of Vieussens, Haller, J. F. Meckel, Vicq d'Azyr, Scarpa, Sœmmering, and a great number of other physiologists, had put the fact of neuro-physiology beyond all question, Xavier Bichat, discovering a sufficient number of distinctive characteristics in the mass of facts presented, proposed to divide the nervous system into its two very distinct departments—the nervous system of relation, and the nervous system of organic life. Shortly after this, there arose a race of neuro-pathologists who, attributing all diseases to nervous influence, and to the nervous influence alone, gave rational explanations of the phenomena of fevers, but explanations which, being very partial, and failing to account for *all* the phenomena, became discredited to a degree far beyond what their true merits and well-founded claims warranted. Such was pre-eminently the case with the doctrines of Cullen, and to a certain extent, even with those of Brown.

However acceptable and truthful any neuropathic theory of fevers might appear when considering a particular *assemblage* of phenomena, still there were ever presented certain other phenomena, which involved the invokement of some humoral or chemical dogma to complete the philosophical consistency of the doctrine, and in its turn, each of these last, when exclusively applied, failed even more signally than neuropathy, to reach their satisfactory interpretation. These several doctrines of disease, the humoral, chemical and neuropathic, each present in one form or another the spirit of its own epoch, the one or the other ever rising above the wave of opposition which almost overwhelms it, comes forth vigorously claiming to possess the whole truth; and even at the present day, they offer the same conflicting aspect which they did in years gone by; for each has its own prized modicum of truth, denied by the others, while even that *modicum* is vitally essential to any system which would present the *whole* truth.

We are not prepared, nor would such a discussion find appropriate place in this essay, to consider at length the phases under which the humoral pathology has exerted its influence upon the medical mind, from the days of Galen to the present time; nor can we either, in this place, urge the many experimental arguments in its favor and in favor of other chemical doctrines, with regard to morbific influences affecting the solid tissues through that vast internal domain, *the blood. Suffice it to say that we fully admit these*

influences in the production of disease, and that disease is rarely induced without some primary modification either in the constitution or elements of the blood, but at the same time we would here firmly resist the dogma that humoralism is a complete doctrine of disease. It is more with the view of consociating, so far as established facts will admit, the inevitable truths of humoralism with the equally inevitable and undeniable truths of neuropathism, that we now enter into an earnest and honest investigation of those two doctrines as they stand related to our subject. For without the partial admission of the teachings of both, we can find no logical nor philosophical consistency in some of our most highly prized lifelong reflections.

Facts, when once developed and demonstrated to be true, must ever and *for*-ever constrain our faithful admission, and though we at a later date may have presented to us a set of *other* facts, apparently negative or even contradictory, it is not the part of a wise philosophy to withdraw our anchor of faith from the first, where we were confidently and safely moored, that we may cast it into the second, though equally safe ground. We must rather seek for and lay hold on some principle of connection which will conciliate and make them *one;* for, if *here* is truth, and also *there* is truth, standing in clearest light of consciousness, we may rest assured that the truth here and the truth there are decreed the same, however deeply the connecting medium may be hidden in the confusion of ignorant opinion. "Truth is one, and the end of philosophy is the intuition of unity."[1]

Fully persuaded that such has been the source of the conflict in medical opinion on many points in the explication of disease, we approach our examination of the nervous system in its relations to febrile diseases, in the hope that certain recent developments in the physiology of the nervous system, though they will not be pretended by us to harmonize entirely, the antagonistic facts of humoralism and vitalism, may yet serve to make mutually consistent and acceptable certain opposite views at present held by different classes of neuropathists, and which, by affording ground for opposition, fritter away the value of some of the best established truths which, as a class of pathologists, the neuropathists possess.

Facts bearing upon the nervous system in its relation to febrile diseases have been long accumulating in the records of medicine,

[1] Sir William Hamilton.

though certainly but few of them have been collected by their contributors with any special reference to this particular subject. Indeed we are not now aware of any elaborate treatise which has for its professed and distinct object, the treatment of the nervous system in its special relation to fevers, which is recent enough to embody any of the late important considerations of its physiology. Still the facts are there—old facts and new facts—some contributed from physiological chemistry, some from experimental neuro-physiology, a multitude from clinical and autopsic observation, while not a few of the most significant character, are presented in toxicology and the climatic relations of the atmosphere to man, the subject of fever, who "lives and moves" in that aërial ocean which surrounds him. In all this accumulation of facts, many of which have remained like a great sea for so long a time, in undisturbed and consequently, in *unproductive* repose, we should certainly find material for evolving valuable results. "I am convinced," says Edmund Burke, "that nothing tends more to the corruption of science than to suffer it to stagnate. These waters must be *troubled* before they can exert their virtues." Unworthy as we are to descend into these "stagnant" waters, and impotent as we feel ourself to be the angel in this Siloam of potential truth, we yet dare to enter, still comforted and encouraged by a reflection of the same elegant author: "A man who works beyond the surface of things, though he may be wrong himself, yet he clears the way for others, and may chance to make even his errors subservient to the cause of truth."

There seems to be an appropriateness in the precept that the generalizer should ever possess the confidence and the boldness of a master in appreciating and in dealing with his data, but we must confess, that this is the precept more for the sophist than for the earnest seeker after truth. Humility and hesitating circumspection are his proper attire, and to these we are forced to add a most deprecating claim for that indulgence which we know too well that our performance will require. What to our mind is clear and well defined, we may fail to present in such a manner, that it will be clear and well defined to others.

In an essay like the present, which is intended specifically to examine the nervous system as it maintains its relations in that broad and well cultivated field of research, known as *Febrile Diseases*, it is not to be expected that each fact adduced, or principle discussed, shall present an entire novelty. There is scarcely a position to be

taken, in relation to this subject, which has not been, at some time, as confidently assumed, as the science of its day would admit. Most of these have either been abandoned, or are at present referred to as the scarcely admitted results of unsound theory, and can only be rescued from an unjust oblivion, by being brought out again to be examined in the light of a more advanced physiology; otherwise they are doomed to obscurity, for perhaps, years to come. Though many of these principles have been long upon the written page of science, they are mostly but shrewd fragmentary surmises—messengers as it were, sent to proclaim the truth, before the facts of experiment and observation had been sufficiently co-ordinated, by which that truth could be established. Thus born before their time, and failing in that nutriment of facts necessary for their vitality, they have lagged famishing in the rear, and almost perished on the highway of *speculation;* we wish now to show that they should lead the van in *science*, commanding and co-ordinating the whole long procession of phenomena with which observation and research are crowding her ranks, as she moves on in her triumphant march toward the goal of ultimate truth. What has been regarded as only a part of the woof, we wish to show is the very warp upon which all the phenomena of fever are fabricated. In a word—we wish to make the relation which the *nervous system* sustains to febrile diseases, the basis upon which all their other phenomena, however diverse and antagonistic, are to be classified and systematically arranged. We have thus endeavored to show that these views, for the want of sufficient physiological data to sustain them, could only be unsubstantial speculation. "Theory is nothing till embalmed in facts;" while we embalm these principles in their own conservative vesture of facts, we hope to establish, that the true theory of febrile diseases, is but these same *facts* forever hereafter fixed, transparently crystallized in the amber of a laborious, but clear and legitimate induction.

At the last annual meeting of the American Medical Association, we presented certain deductions on the subject of the nervous system in febrile diseases, simply as the results of our investigations in this department of medicine. Our views were embodied in a number of categories, which may be regarded as postulates in relation to this important and interesting subject. It is now our desire to examine each one of these positions separately and distinctly, and

in justice to the Association and to ourself, to develop as briefly as possible the *process* by which these conclusions have been arrived at. Though in carrying out the object thus proposed, we shall, in the main, adhere to the method of examining the several propositions *seriatim;* there will occasionally occur passages in this discussion, in which the advantage of a clearer and more pertinent collocation of the facts and data, may induce us to depart from the strict observance of this general plan.

PROPOSITION I. "As all the normal phenomena of the living organism are known to occur under the superintending influence of the nervous system, and are dominated by it, so it is but rational to regard all morbid actions as being more or less influenced in their manifestations by aberrated nervous action,[1] etc. etc."

In verification of the first part of this proposition, the history of medicine affords such abundant testimony, that a bare reference to them at the present day, will amply serve to gain a ready admission of the fact. Near the middle of the seventeenth century, Francis Glisson, of the University of Oxford, recognizing in that peculiar force of the living solid tissues which the Hippocratists had termed *archæus*, or the vital spirits, a more generalized relation which he termed irritability, and which he regarded as a sufficient cause for all the phenomena of life, said that, "all the tissues are endowed with this force in different degrees, and proposed to divide it into natural, vital, and animal, accordingly as it is manifested by movements more or less apparent with, or without the concurrence of the will." John Goester, a Dutch anatomist, again advocated these doctrines of irritability, but as yet, no experiments with the design of testing the truth of these views had been made. Haller was the first who directed his attention to experimental researches in the nervous system, and we find the result of his immense researches, in a work published by him in the year 1747, entitled, *Primæ Lineæ Physiologiæ*, in which work are traced, for the first time, the true characters which distinguish living tissue from dead substances.[2]

He here discriminates clearly between the vital contractility of the tissues and mechanical contractility, or elasticity. He shows that vital contractility is found in the muscles, and that it is extinct with life, while elasticity pertains to the tendons and membranes

[1] Transactions of the American Medical Association, vol. x. p. 457.
[2] Renouard's History of Medicine.

as well as the muscles, and that it continues a short time after death. From his experiments, he concludes that muscular irritability "proceeds from nervous influence, for the nerves of the spinal marrow being irritated," he says, "the muscles which receive their nerves from these parts are violently convulsed, even in dead animals. The nerve of a muscle being tied or cut, it relaxes, and cannot in any way excite vital movement; if the ligature is taken off it recovers its vital contractility. We find the weight that a muscle can elevate during life is sufficient to separate and tear it after death." At this date, experimental physiology, is generally conceded to have had its birth. From this, it will be seen, that even at this early date, the influence of the nervous or vital forces was fully recognized as essential to the phenomena of life, at least in its normal manifestations; while somewhat later the celebrated Bichat is seen to recognize it, even in the fluids of the animal economy, though he cannot exactly determine in what this vitality consists. "Its existence," says he, "is no less real on that account, and the chemist who analyzes the fluids has before him only their cadaver, just as the anatomist has, but that, in the solids which he dissects."[1]

Early among those who were led to acknowledge and to demonstrate by experiment, the influence of the nervous system over the normal acts of the living being, was Pourfour du Petit, whose experiments on the sympathetic nerve in dogs, as clearly proved that this portion of the nervous system had its own peculiar reign in the nutritive functions, as did those of Haller establish the same truth in regard to the cerebro-spinal nerves in the functions of animal life. Since that time, Mollinelli, Arneman, Cruikshank, Dupuy, Magendie, Sir Charles Bell, Dr. Marshall Hall, Sir Benjamin Brodie, John Reid, and Fleurens, while in the present day, Claude Bernard, Brown-Séquard and a host of others, both in this country and in Europe, by their valuable experimental researches and clinical observations, are adding every day to the now well established fact stated in the first part of our proposition, viz: that "the normal phenomena of the living organism are dominated by the superintending influence of the nervous system."

We have further stated, in our first proposition, that "it is but rational to regard all morbid actions as being more or less influenced in their manifestations by aberrated nervous action." The doctrine of irritability, which is that of the nervous influence in its early stage, was first applied to pathology by P. A. Fabvre, a

[1] Anatomie Générale.

French physician, in 1784.[1] Bichat also in this department early developed the most valuable truths; while, since his day, a long line of autopsic observers and experimenters, down to the present time, attest the truth of the position by the observed phenomena of diseased action being coincident with deranged conditions of either the nervous centres, the affected nerves themselves, or of some *other* nervous centres or nerves intimately connected with them by reflex action. In the experimental field bearing upon this question, the artificial pneumonia of John Reid, the artificial congestion of Arneman and Dupuy, and the more recent artificial diabetes of Mons. Claude Bernard, together with his artificial increased animal heat, and also the artificial engorgement of M. Brown-Séquard, confirms the inductions from clinical observations made in this and in European countries.

Indeed, the daily observation of every practitioner gives too plain and unanswerable confirmation to the doctrine, to allow us longer to discuss this portion of our first proposition, and we, therefore, proceed to that part of it which embodies the main problem of our essay, and which will, in its various phases of argument, occupy the entire space devoted to the subject, viz: "In that class of diseases ordinarily designated fevers, our researches and observations have led us to the confident belief that the above law applies with sufficient prominence to constitute *the basis* of their classification; and we would here claim for it, that it is the only *reliable* basis of their classification, and further, that in its more extended application, it will hereafter be found to constitute what may be called, *par excellence*, THE LAW OF FEBRILE DISEASES." To endeavor to establish this law, to show the various grounds for its recognition, both in the physiology of the nervous system, and in the phenomena of the two classes of fevers indicated in the succeeding proposition, must now engage our earnest and diligent attention.

Every discussion which has for its object the consideration of morbid states and phenomena, in their relation to the nervous system, presents itself with the necessary condition that we begin with a clear and distinct appreciation of the various facts and phenomena upon which our knowledge of the anatomy and normal physiology of the nervous system itself is based.

This is pre-eminently the case in regard to the discussion of fe-

[1] Recherches sur differents points de Physiologie, de Pathologie, et de Thérapeutique. Paris, 1784.

brile diseases in their present relation, on account of the confusion of phenomena presented in this class of diseases, and also as much on account of the *confusion of medical opinion* which has become the habit—the second nature—of the profession in characterizing the various phenomena presented by them. We can only thus appreciate fully the *departures* from the normal standard which morbid phenomena present, and thus being able to estimate the character and amount of that departure, we can the better trace it to its ultimate source. We are, therefore, unwilling to enter further into our investigation without a brief but sufficiently comprehensive consideration of the nervous system, and this we find suggested by the second proposition of the compendious report presented by us to this Association on a former occasion.[1]

PROPOSITION II. As in the nervous system we recognize two grand departments, viz: 1st. The cerebro-spinal system, all the normal actions of which are subject to cessation and interruption; and, 2dly. The ganglionic system, all the normal actions of which are of a *continuous* and *uninterrupted* character, so in the manifestations of febrile diseases do we distinctly recognize two grand distinguishing characteristics, respectively typifying the normal actions of these two systems of nerves. Thus, a character of *paroxysm* obtains in certain cases, while a character of *continuousness* as plainly marks the others.

Here we have the peculiar *method* of the two systems stated pertinently to their relations to the methods of the two classes which we recognize in fevers. In the first part of Proposition III., we have presented the CHARACTER OF THE ACTION of the two systems as they pertain to febrile phenomena, thus:—

PROPOSITION III. As in the cerebro-spinal system, we find that its normal action pertains almost exclusively to sensation and to motion, with only a secondary and comparatively remote influence (which we have termed excito-secretory) upon nutrition and secretion, while in the normal action of the *ganglionic system* the entire function is known to be to preside over nutrition and the secretions, so in *paroxysmal fevers* do we find intense pain, modified sensation, and symptoms allying them to neuralgic and convulsive

[1] Transactions of the American Medical Association, vol. x., 1857; also, Essays on the Secretory and Excito-Secretory System of Nerves. Phila., 1857.

diseases very prominent; while in *continued fevers*, modified nutrition and altered secretion are the marked and most prominent characteristics.[1]

As in the case of Proposition I., already presented, so with Propositions II. and III., only the first portion of each will at present claim any special consideration. We think that at the present day it will require but little remark on our part to secure the ready admission of the principles embodied in these first portions of each.

We have already stated that Bichat, with a comparatively clear appreciation of the significance of nervous phenomena, finally properly classified them so as to attribute some to one portion of the nervous system, viz: the cerebro-spinal, which he termed the nervous system of animal life, or of relation; while others he appropriately classed, and attributed them to another portion, viz: the ganglionic system, which he termed "the nervous system of organic life." The justness of the data by which he arrived at this clear induction, is so fully acknowledged by the profession in all countries, at the present day, that his classification of the nerves and nervous actions is, now, nowhere doubted. Without, therefore, arguing the question, we will here state the characteristics of the two nervous actions, in terms used by us on a former occasion, and with another object.[2] Firstly, then, "it is to the cerebro-spinal system, with all its endowments of sensation, motion, special sensation, and, perhaps, even intellection,[3] that the being owes his adaptedness for a relation with the objects of the external world.[4] Between the various portions of this great system, while there exist separations and distinctions of the most obvious character, there are also relations, mutual and intimate, which are of the first importance to the individual. The senses, endowing him with the æsthetic faculty, enable him to spread before him on the field of consciousness all that is passing in the world without, while

[1] Opéra citata.

[2] *Vide* Prize Essay on Excito-Secretory System. Trans. Amer. Med. Ass., vol. x.

[3] Herbert Mayo, on Nervous System.

[4] Sir Benjamin Brodie, in his recent Philosophic Dialogues, entitled "Mind and Matter," makes one of his interlocutors say: "Ergates regards the brain, properly so called, as the physical organ by means of which alone, to use his own expression, the one indivisible, percipient, thinking being which each one of us feels himself to be, maintains its communication with the external world."—*Mind and Matter*, p. 116.

the internal or intuitive phenomena complete the contents of this same field."[1]

Thus the sensible world without and the world of intellect within according to some[2] are pictured as it were, upon a canvas or blank sheet, and presented to the reason and the judgment as data by which, the being may direct and shape his conduct under the influence of a supreme principle of our organization, *the will.* These constitute the voluntary acts of animal life. Then, on the other hand, there are certain muscular acts, equally amenable to the dictates of the will, which are performed independently of the cerebral organs, apparently, and without putting in requisition either reason, judgment or the will, under the influence of the, so to speak, vicarious power of reflex action.

This last set of phenomena constitute a body of facts classed under the general term of excito-motory action, and for the full development of which science is indebted to the genius and labors of Dr. Marshall Hall.

We have here presented the endowments attributed to the cerebro-spinal system. Among these endowments, the most prominent and universal, are those of *sensation* and *motion;* these attributes being made available in the one case, and in the other, by the display of sensitive nerves upon external surfaces, which are hence called *sentient* surfaces, of which the skin is the principal, and also by the distribution of the nerves of motion to the muscles, and these last, in a state of health, are under the dominion of the will. But still, as we have just said, the will may be interrupted or held in abeyance,[3] and yet irritation may be carried by the nerves and *reflected* upon the muscles, resulting in motion, for, in the words of Herbert Mayo, "In the entire living frame *each segment* of the cranio-spinal cord with its nerves (singly or in combination) is sufficient to originate those actions of muscles, and of other contractile parts which are directly consequent upon sensation, and occur independently of the will."[4] This author further remarks: "The nerves of sensation and of motion which supply any

[1] "Consciousness is the accompaniment of all our faculties, and, so to speak, their echo. . . . . Consciousness is nothing else than the rebound of the action of all our faculties."—VICTOR COUSIN: *History of Modern Philosophy*, vol. i. p. 322.

[2] Locke.

[3] See Clinical Lecture on Traumatic Tetanus, delivered at Jackson Street Hospital by the Author.

[4] Nervous System and its Functions, by Herbert Mayo, London, 1842, p. 49.

given region of the body are derived from the same part of the nervous centres, and that the impulse transmitted along the nerves of motion are habitually excited, and also guided by the nerves of sensation; of these facts we have remarkable verification in cases of paralyzed sensation, while voluntary motion remains perfect. Every act, under such circumstances, is guided and directed by the eye; sensation, the ordinary avenue to consciousness being cut off." Dr. Brown Séquard, whose experimental investigations in every department of the nervous system have served to clear many of the obscurities resting upon its physiology, remarks: "It is not necessary for the existence of the reflex power, that the spinal cord should be without alteration. I have found the reflex faculty remaining in pigeons after I had crushed the spinal cord and produced in it considerable alteration. This is important to be known to practitioners to prevent their drawing the conclusion, from the existence of reflex action after a fracture or luxation of the vertebral column, that the spinal cord is healthy."[1] The special centre must be healthy, but not necessarily, the entire cord. Such, then, is the nature of cerebro-spinal nervous action and the character of the relation subsisting between its two prominent departments the sensory and the motory. The facts here stated we shall recur to frequently, and perhaps refer to certain others of a more special character not adduced in this general statement.

THE GANGLIONIC SYSTEM.—The sympathetic or secretory system of nerves consists, as we are aware, of a chain of ganglia extending, it is thought by some,[2] from the anterior communicating artery of the brain to the ganglion impar, at the lower portion of the spinal column, is found everywhere in intimate relation with the vascular system, and particularly with the arteries. It is evidently the nerve of the bloodvessels and the branches follow and ramify upon their coats, clinging to and encircling them "as the ivy entwines itself around the oak." Wherever there is a secretory surface or a gland, which is only a complex secretory surface, wherever the metamorphosis of blood is going on, or the elimination of a secretion is being performed, there we find distributed in greater or less profusion the *branches* of the ganglionic system; while in convenient collocation to every secretory apparatus, we find one or

[1] Physiology and Pathology, by E. Brown Séquard, New York, 1853, p. 6.
[2] Ribes.

more of the ganglionic *centres* of this system, apparently designed to superintend and direct and to supply nervous force for the mysterious operation. Abundant physiological experiments and pathological observations have demonstrated these truths for more than a century past, so that at the present day, it is known that, to the ganglionic system, and to that system alone, are confided all those important, silent and continuous processes which go on uninterruptedly within the interior of the organism, which pertain to nutrition and secretion in its every part, or in the words of Bichat, "Those thousand secret operations of a living body." It presides over all our chemico-vital actions, superintending and directing all blood-changing processes and instigating all metamorphoses occurring in the intimate structure of the animal tissues. It is the system for the internal and individual wants of the organism, and its possession enables the being to sustain an independent and individual existence, carrying on, to a certain extent, all the strictly organic actions without the aid of external influences.

The above will, perhaps, sufficiently characterize the distinct nature of the innervation of the two nervous systems, but inasmuch as we refer pointedly to the two *methods of action* marking the two, and as we claim that these *methods* constantly extend far into the manifestations of the *diseased* action of these two systems, we will now consider them briefly in this particular relation.

"All the normal actions of the cerebro-spinal system are subject to cessations and interruptions, while those of the ganglionic system are of a continuous and uninterrupted character." (See Prop. II.)

Bichat[1] is, perhaps, the first who has recorded any opinion about the two nervous systems in their very distinguishing characteristics as presented in this aspect. "This man," says an historian of medicine,[2] "whose career was so short and yet so complete, *commences* by tracing clearly the characters that distinguish vital from physical forces;" and though he does not distinctly state the particular nervous system referred to, we can see plainly that by the "vital forces" in the relation which he presents them, he means more particularly the manifestations of cerebro-spinal action. "The one," he says, "varies unceasingly in its intensity, energy and developments, passing often with rapidity from the last degree of prostration to the highest point of exaltation, accumulating and wasting by turns, and assuming, under the influence of the slightest causes,

[1] Recherches Physiologiques sur la Vie et sur la Mort. [2] Renouard.

a thousand various modifications, sleep, wakefulness, exercise, rest, digestion, hunger, the passions, the action of bodies surrounding the animal, &c.—all expose them at each moment to *numerous changes*." That this interrupted character of the nervous action in the cerebro-spinal system was afterwards recognized by others, we can quote no higher authority to prove, than the opinion of Lobstein on this very subject of *intermittent fever*, although he does not appear to have very clear ideas as to the exact location of the disease, as will be seen when hereafter we quote the entire paragraph. He says that "the paroxysms of intermittent are tied down to a regular 'rhythmus' in consequence of being radicated in the nervous system, upon which nature has impressed A LAW according to which they must perform their functions *periodically*,"[1] and yet Lobstein in the imperfect developments of but a few years back, allowed this clear idea of periodicity to become obscured, and in the confusion of the phenomena presented by a paroxysm of intermittent fever, was led to locate its proximate cause in the ganglionic system, or at least to suggest that location for the disease. Subsequent discoveries have rendered it now possible, to clear away this confusion, and to explain rationally and consistently the apparent contradictions in febrile manifestations—more of this, however, in the subsequent parts of this essay. By the physiologists of our own day, the idea of this periodicity is most clearly and distinctly enunciated; thus Henle, the most accurate and philosophic of modern observers, gives his opinion on this subject with a clearness that admits of no questioning: "All pathological symptoms are only the phenomena of the physiological vital processes under changed conditions; so also rhythm in disease is nothing else than the rhythm of the normal vital process itself. This in disease may become more distinct, it may become changed, obliterated, and even disappear entirely, as for instance in mania and other nervous diseases, every trace of the periodic exacerbation and remission of the nervous activity, is often lost between the time of sleep and waking. But in every case, there are only two causes to which the periodicity of disease is to be referred: either the noxious potency operates rhythmically, or the morbid symptoms depend upon the changed function of an organ *whose healthy life is periodical*."

Again, he says: "A moderate activity is endured for a long time, one abnormally increased is followed by an exhaustion whose depth

[1] Structure and Functions of Sympathetic Nerve, J. F. Lobstein, p. 121.

and duration are proportional to the excitement. This exhaustion is not perceptible from slight exertion, but it is very distinct in the dazzling spectra that occur in the eye, in the fatigue after muscular motion, &c. The rhythm becomes also more perceptible when the vital power is already exhausted. A continued tone or sound is heard continuously at first, but after a while it pauses. An object of sight that is looked at continuously for a long time, appears at last *alternately*, distinct and indistinct; the exertion of a voluntary muscle is in the beginning, continuous, then trembling, and finally by jerks, notwithstanding slight oscillations are perceptible even in the beginning, only the pauses gradually become greater."[1] Henle carries this idea of exaggerated and modified rhythm even into an attempt to explain the types, as tertian and quartan, of paroxysmal fevers, and also the seven-day periods of relapse, but we fear that the present state of physiological science does not furnish sufficient data for satisfactory and legitimate reasoning upon our observations in these, as yet, obscure phenomena. Suffice it then to say, that every *fact* connected with the phenomena of the cerebro-spinal system plainly develops the principle of *alternation* in its action, and that this not only pertains to the common acts of ordinary sensation and motion, but to special sensation, as above seen, and even to the highest endowments of that highest development of the cerebro-spinal system, *the brain*, reaching up into its exalted exercise of *intellection*. Attention too long continued, must by the organic law, relax into lethargy, and consciousness itself, the least voluntary and perhaps the most mixed of all our rational endowments, must yield or be held in daily comparative abeyance during the renewing and refreshing hours of sleep: "The load of life and of sin," beautifully writes Garth Wilkinson, "is lightened in sleep, which lets out an ever-new man through the merciful gates of the morning."[2] On the other hand, how different is the method employed by the ganglionic system in the manifestation of *its* phenomena. Throughout the whole domain of the secretory system there is seen, a regularity and unintermitting *continuousness* prevailing, which is one of the chief and most notable characteristics distinguishing its actions from those of the cerebro-spinal system. It presides, as we have said, over the organs of the circulation and the secretions, controlling and instigating, so to speak, the heart's

[1] Henle, General Pathology, p. 321.
[2] The Human Body, and its connection with man.

action, and under its sway all our nutrient and secretory acts are carried on with unvarying regularity. From the first moment of embryonic existence when the *punctum saliens* indicates the beginning of a circulatory apparatus, for sixty or one hundred years, till the heart is stilled in death, the same monotonous and unvarying action marks as plainly the source and character of its innervation, as do the uninterrupted processes of nutrition and secretion indicate the reign also of the ganglionic system.

There are many recorded facts and observations, as well as many circumstances besides these referred to, which would serve more elaborately to corroborate this principle, but the fact of continuous and comparatively uninterrupted action in the ganglionic system, is of too plain and notable a character to require in this place any further discussion. Another property of the ganglionic system developed by the experimental researches recently of Dr. Claude Bernard, of Paris, and reported in the *Comptes Rendus*, are mentioned thus by Dr. Brown-Séquard.[1] "My friend, Dr. Claude Bernard," says he, "has recently discovered the curious fact, that, after a section of the sympathetic nerve in the neck, the face on the same side, and more particularly the ear, become *warmer* and more sensible than the other side. The vessels are much enlarged, and a great many are visible which were not so before the operation."

"A great many facts," he continues, "prove that the *degree of temperature* and sensibility of a part is in close relation with the quantity of blood circulating in that part. As to the elevation of temperature, I have seen, as Dr. Bernard has, that the ear exhibits one or two degrees of *Fahrenheit* more than the rectum, but it must be remarked that the temperature of the rectum is a little lower than that of the blood, and as the ear is full of blood (after this section), it is very easy to understand why it has the temperature of blood."

Dr. Brown-Séquard goes on to state that, "if galvanism is applied to the superior portion of the sympathetic nerve after it has been cut in the neck, the vessels of the face and ear which had been dilated by the section begin to contract after a certain time; their contraction increases slowly, but at last, it is evident that they resume their normal condition if they are not even smaller. Then the temperature and the sensibility diminish in the face and ear, and they become in the palsied side the same as in the sound side.

[1] Experimental Researches applied to Physiology and Pathology, N. Y., 1853.

When the galvanic current ceases to act, the vessels begin to dilate again, and all the phenomena discovered by Dr. Bernard reappear." The extreme value of these thermal phenomena will be fully estimated when we come to consider the subject of fever heat in its relation to the nervous system.[1] The same work abounds in valuable experimental facts, a few of which we have added, and their pertinence to our subject will be hereafter seen. "I have found," he says, "considerable *hypertrophy* of the supra-renal capsules of eight or ten Guinea pigs, upon which a lateral half of the spinal cord had been cut in the dorsal region for eight, ten, or fifteen months. These organs had acquired, in some of these cases, three times their natural dimensions, in others only the double. "By an examination," he continues, "of the supra-renal capsules in Guinea pigs on which I had made the section of the lateral half of the spinal cord a few hours or a few days previously, I have *found these organs congested* and sometimes containing even a slight *effusion of blood.* It is very probable that such a congestion has been the cause of the hypertrophy found in animals operated on at a much longer time previously. *The congestion is certainly the result of a peculiar disturbance in the nervous action.* A part only of the spinal cord appears to possess that singular influence on the supra-renal capsule. That part is extended in Guinea pigs from the tenth costal vertebra to the third lumbar. A *simple puncture* of the cord is frequently sufficient to produce the *congestion*[2] of both supra-renal capsules."

The above brief sketch of the two nervous systems and their distinctive methods of action, is for the present sufficient to secure their full appreciation. There is, however, another function of the nervous system which here we will only define in passing. We refer to that relation subsisting between the centres and sensitive branches of the cerebro-spinal system on the one hand, and the centres and branches of distribution of the ganglionic system on the other; by virtue of this relation it has, during the last eight years,[3] been developed that the cerebro-spinal system under certain

[1] In cats and birds the greater portion of whose spinal marrow had been destroyed, the temperature remained normal. Op. cit., p. 15. We shall have occasion hereafter also to refer to observations and experiments of Sir B. C. Brodie on the influence of nervous centres on animal temperature.

[2] All the Italics are ours.

[3] See Essay on Dentition, Southern Med. and Surg. Journal, 1850. Essay on Typhoidal Fevers, 1853. Claim of priority over M. Claude Bernard. Letter to Dr.

circumstances is capable of exciting and instigating the ganglionic to the exaggerated exercise of every one of the functions attributed to it, whether of secretion, vaso-motion, mathæmatism, controlling of circulation, or governing of animal temperature, and further, that by over-stimulation through this source the functions of the ganglionic system can become so crippled and aberrated as to be effectually paralyzed, and thus give rise to the most serious *structural* derangements. We refer here to that function first distinctly announced by us and termed excito-secretory. Of this function and its etiological bearing upon febrile phenomena, we shall have occasion to argue more fully in subsequent parts of this essay.

To resume, then: we have seen in the nervous system two grand departments, viz., cerebro-spinal, comprehending all æsthetic, intellectual, and senso-motory phenomena. 2d. The ganglionic entirely distinct, governing all circulatory, secretory, and nutritive acts in their widest sense, and immediately underlying the causation of animal temperature, so far as nervous instrumentality is concerned, and finally, we have seen that between all portions of the sensory element of the cerebro-spinal and the ganglionic system there is an intimate and potent reflex relation by which the former excites, influences, and under certain circumstances, entirely controls the acts of the latter, even to the complete subversion of its healthful reign in the animal economy.

MORBIFIC INFLUENCES.

This nervous system, thus constituted, with all its delicate and nicely appointed endowments, its inherent potencies, and its responsive reflex susceptibilities, is subjected momentarily, to the multitudinous aggressions of the external world; its thermal, luminous, electric, hygrometric, and toxic conditions, all more or less coming into relation with it, to depress or to exalt, to paralyze or to disturb, both its direct and its correlated energies. But besides being subjected to the external world, it is submitted to influences from within, equally potent; influences from an *internal* world—a vast and all pervading domain—THE BLOOD.

Marshall Hall. Prize Essay on Excito-Secretory System of Nerves, and also our last report on N. S. in Feb. Diseases. Transactions, vol. x. Also Essays on Secretory and Excito-Secretory System.

Lieut. Maury,[1] with great aptness of expression, has styled our atmosphere a "great aerial ocean;" the blood may be considered, in its relation to the nervous system, a great ocean too. Bathed continually in the waves of these two mysterious oceans, an *aerial* ocean without, and a *sanguineous* ocean within, who can deny that the nervous system, both in health and in disease, must yield to their all potent sway?

It would be a most interesting exercise to study here the nature of both atmospheric and blood influences as they stand in their relation to the nervous system in febrile diseases. But this subject alone would fill a volume, and even its bibliography is too extensive for the limits of a compendious essay.

Atmospheric influences on the animal economy, became the subject of observation and record at a very early period in the history of science. Empedocles, of Agrigentum, more than 2000 years ago, is the first we find mentioned as having made use of such observations in relation to hygiene. "From time immemorial," says Renouard,[2] "pestilential fevers ravaged periodically his native city. He observed that the appearance of these fevers coincided with the return of a wind named Sirocco, which blows in Sicily, from the east and south. He, therefore, advised to close by a wall the narrow gorge which gave passage to the wind when it blew on Agrigentum. His counsel was followed, and from that time, the pest ceased to make its appearance in the city.

"The inhabitants of Silenus were a prey to an epidemic disease. A stream, by its sluggish course, filled the city with stagnant waters, from which were evaporated, daily, mephitic vapors. Empedocles saw this, and caused two small creeks to be conducted into it. This gave a new impulse to the waters, which ceased to be stagnant, and to exhale their noxious effluvia. The scourge disappeared." Thus we find, in the earliest accounts of the atmospheric causes of fevers, as full a description of the conditions necessary for their efficiency, as we do even at the latest day. See, for instance, a record found in Dr. Lewis's *Medical History of Alabama*,[3] furnished apparently by Dr. Wooten. "Mr. P. E. had negro quarters situated on the first prairie elevation above the low grounds of a small creek, the fourth of a mile from the houses. This belt of low grounds fre-

[1] Physical Geography of the Sea.

[2] History of Medicine—Primitive Period, p. 88.

[3] Medical History of Alabama, p. 17.

quently overflowed, causing water to remain in holes over the entire breadth, on the subsidence of the stream; but it was well shaded by a dense foliage, the plantation lying on the prairie, in the rear of the cabins. In the winters of 1842 and 1843, the trees between the houses and creek were cleared away; and up to that time, some eight or ten years, the negroes living in this quarter had enjoyed uninterrupted health, a case of fever scarcely ever occurring. During the summer of 1843, the first after the forest had been cleared away, fever prevailed amongst the negroes with great violence, continuing until frost. The negro quarters were afterwards moved to the opposite side of the creek, about the same distance from it, but with an intervening growth of timber, and no fever has occurred in the place since." "I have known," says Sir Gilbert Blane, speaking of bilious remittent fevers, "a hundred yards in a road make a difference in the health of a ship at anchor, by her lying under the lea of marshes and not in another." We might here record a multitude of similar observations, offering, in substance, the same results as offered over 2,000 years ago by those of Empedocles.[1] "A thousand years here, truly, has been as one day," so far as any appreciable advancement has been made into the *nature of the cause.*

This is no field for generalization, but for experiment and observation, and both experiment and observation must take a *new direction*, or command better and more efficient appliances, before any advance can be made. "The essential efficient producing cause of periodical fever," says Dr. Bartlett,[2] "the poison whose action upon the system gives rise to the disease, is a substance or agent which has received the name of *malaria* or *marsh miasm.* The nature and composition of this poison is wholly unknown to us, like most other analogous agents—like the contagious principle of smallpox and typhus, and like the epidemic poisons of scarlatina and cholera, they are too subtle to be recognized by any of our senses; they are too fugitive to be caught by any of our contrivances. Neither the strongest lenses of the microscope, nor the nicest analyses of chemistry, have succeeded in discovering the faintest traces even of the composition and character of these invisible, mysterious, and stupendous agencies." "As always happens in such cases, and under similar circumstances," he continues, "in the absence of positive

[1] "Empedocles flourished about B. C. 440, and was consequently younger than Parmenedes and Heraclitus."—*Vide* History of Philosophy, by Dr. Albert Schwegler, p. 38, 1856.

[2] Op. citat.

knowledge, we have been abundantly supplied with conjecture and speculation; what observation has failed to discover, hypothesis has endeavored and professed to supply. It is quite unnecessary even to enumerate the different substances to which malaria has been referred; amongst them are all the chemical products and compounds possible in wet and marshy localities; moisture alone; the products of animal and vegetable decomposition, and invisible living animalculæ. The hypothesis of the animalcular origin of this and of some other endemic and epidemic diseases is an old one, which has been recently revived and advocated with great ingenuity and ability. It is only an hypothesis, but it may be safely said of it that it may be made to correspond to the ascertained phenomena, in connection with the etiology of these diseases, better than most other hypotheses, and that it is less embarrassed by objections, which cannot be met, than most of them."

As we have said before, and we here distinctly reiterate it, *we have nothing to do with the nature of the causes;* in the present discussion our search is after the *Laws of Phenomena;* the nature of the remote causes of these phenomena, is entirely and confessedly beyond our reach and comprehension. Let no one accuse us of any such attempt.

We have said that observation and experiment must take a new direction. We have good reason to hope that they have already taken this new direction—indeed led off into *many* new paths. Of what vast importance and hopeful significance are Lieutenant Maury's investigations into ocean currents and wind currents; Dr. Forry's statistical tables and discussions of climatic relations to physical geography—those immense and valuable meteorological registrations, which are annually being made by the medical officers of our army and navy in all parts of the world, and which have been published by Congress;[1] Dr. J. C. Nott's experimental investigations into the atmospheric conditions in relation to epidemic diseases, as yellow fever; the developments in geological science; the developments in the science of atmospheric temperature; electricity; moisture, and even in the influence of luminous radiations upon the metamorphosis and constitution of living organized tissues. Yes, "in this view of the subject," to use the words of Lieut. Maury, "we see light springing up from various sources,

[1] For the volume containing this valuable record, we are indebted to Dr. Robert Southgate, now of this city, formerly surgeon in the United States Army.

by which the shadows of approaching confirmation are clearly perceived." Earnest men in all departments, some entirely dissimilar to medical science, are daily supplying us with those "gossamer-like clews, that sometimes seem almost palpable enough for the mind, in its happiest moods, to lay hold of and to follow up to the very portals of knowledge, where pausing to knock, we may boldly demand that the chambers of hidden things be thrown wide open, that we may enter to see and understand their mysteries."[1]

THE BLOOD.—Now underlying all our considerations of the widely extended power of the nervous system in its relations to the phenomena of disease, is the necessary and unavoidable recognition of the influences of that mysterious, and yet most potent, and if possible, more pervading agency—THE BLOOD. This *blood*, the separate inquisition into whose phenomena, yields so little at present, will some day, when experiment shall have been properly directed upon it in its relations to the nervous system, inevitably supply the link which shall give entire consistency to the chain of morbid phenomena. As we have said, it is truly an internal world, to which man and animals stand most intimately related, in a position somewhat analogous to his relation to the atmosphere; yielding influences just as potent, more extensive and far more direct, than those supplied to him by that external medium. Like water absorbed into a sponge, it comes in contact with every organ, bathes and irrigates the intimate structure of every tissue, and is the source from which, the cell-membrane of our ultimate component parts absorbs directly its material, either for metamorphosis into its own fabric, or for the elaboration of the secretions.

The modification of its elements *must* then sensibly modify the manifestations of nervous action, whether æsthetic, senso-motory, or nutrient.[2] No one at the present day, can reasonably and legitimately deny, that medicines, at least *some* medicines, especially the

[1] Physical Geography of the Sea, p. 119.

[2] The blood corpuscles collectively, form an immense gland, which elaborates the materials of the serum into compounds for the nervous and muscular system, and probably for the various secretions. Whatever, therefore, destroys or alters the chemical changes of the colored blood corpuscles, must produce corresponding changes in the secretions and excretions, and in the structure and action of the nervous system.—Prof. Jos. Jones, on Malarial Fever: *Southern Med. and Surg. Journal*, Sept., 1858.

vegetable alkaloids act upon the nerves and nervous centres through the medium of the blood, the corpuscles or some other element of this fluid acting as *carriers* of these matters to the nervous centres. Many are of opinion that all medicines in all instances,[1] have their efficient action in this way. Strychnine placed upon a spinal centre will induce convulsive action in the voluntary muscles.[2] Lead applied to the surface of the hands in painters, is known to produce that common affection among them called "wrist-drop."

If, says Dr. Todd,[3] "a portion of a nerve of any animal be bared, and chloroform be applied to the surface, the whole nerve beyond becomes paralyzed on account of its conducting power being injured by the paralyzing effect of this agent." We are all familiar with the fact, that this last agent applied to the surface of the hand will first cause a burning pain, then, soon a tingling in the nerves of the part, and finally, nullify sensation there for a time. On the other hand, what are the actions of these three agents when taken into the system? Exactly those found on local application to nerves and nerve centres; the strychnine exalts the polarity of the centres, and convulsive action results. Lead depresses polarity of centres and so modifies the nerve that paralysis follows. Chloroform swallowed, or inhaled, modifies nervous action, so as to represent fully the phenomena presented on its local application. We have therefore to admit, that as the manifestations are the same, whether the agent is applied locally, through the mouth, or through the lungs, that modifications in the constituents of the blood must be efficient in modifying nervous action.[4]

No one would deny, we suppose, for a moment, that the blood is the carrier of the nutritive *elements* to the tissues, that under certain *affinities*, the particular tissues each select their appropriate pabulum; then for as good a reason, no one can deny, that should a

[1] Headland, Action of Medicines.

[2] See Marshall Hall's Experiments on Frogs. Frog-tests for strychnine, &c.

[3] Todd on the Nervous System.

[4] See the experiments of Sir Benjamin Brodie, to determine the mode in which various poisons affect the animal economy. His conclusions are, that some of these produce death directly through the influence of the nervous system, while in other instances, death is caused by the poisoning of the blood and the morbific agent reaching the nervous centres through this fluid. His experiments most conclusively demonstrate both these modes of action. These researches were made as early as 1811 and 1812, and we know of none others which can compare with them, whether made before or since, for faithfulness of execution, or for the unbiassed honesty with which the results are reasoned upon by their author.

poison gain ingress to the blood, it must carry *that* to the tissues, and that each of these tissues have inherent *susceptibilities*, or we may even say here, *affinities*, by which they are impressed by this poison, and this impression they manifest *in accordance with their normal mode of function.* The nervous system, composed of some of the most important tissues of the animal structure, is washed and impercolated by the fluids of the body, it has its own delicate susceptibilities, its own affinities for the sanguineous elements, and it has its own mode of manifesting the impressions made upon it, whether through the centres from within, or through the nerves from without; and these modes of manifestation, as we have endeavored to illustrate in the earlier part of this paper, are the most thoroughly understood and most accurately determined and the most invariable and consistent, in the whole domain of physiology. It is these phenomena and the fully established and fully admitted laws of these phenomena, when brought into philosophical relation with the equally established phenomena of febrile diseases, that it will be our duty to interrogate in the subsequent pages of this essay. In order to carry out this object, it is necessary now fairly to present the phenomena of the more prominent forms of these diseases, and these are compendiously stated in the second parts of Propositions II. and III., the first portions of which we have heretofore been engaged in discussing.

PROPOSITIONS II. AND III. AS THEY REFER TO FEBRILE PHENOMENA.

"In the manifestations of febrile diseases, we distinctly recognize two grand distinguishing characteristics, respectively typifying the *normal* actions of the two systems of nerves; thus, a character of *paroxysm* obtains in certain cases, while a character of *continuousness* as plainly marks the others. So also in paroxysmal fevers do we often find intense pain, modified sensation, and symptoms allying them to neuralgic and convulsive diseases very prominent; while in *continued* fevers, modified nutrition and altered secretion are the marked and prominent characteristics."[1]

In entering the annals of recorded medicine, with the view of selecting and presenting the essential phenomena of fever, in order to classify them for advantageous discussion in the relations as-

[1] Transactions of Amer. Med. Asso., vol. x. p. 450.

signed us, we find ourself in a boundless sea of erudition, in which scarcely any principle, or method, or system, can guide us safely to the attainment of the desired end.

Every account of fever presents, it is true, in all faithfulness, its prominent characteristics, each one in a graphic picture, and with a reliable history of its phenomena; but at the same time they are presented with so little respect to any guiding principle or systematic arrangement, that to attempt to classify them for the purposes of induction, might aptly be compared to evolving some beautiful piece of composition from the pages of a lexicon—the words are there, and, *potentially*, they are a whole library of such volumes; but to construct them into sentences, and these sentences into paragraphs and pages, which, throughout the production, shall portray the one consistent, beautiful idea, which is to become the soul of the volume, will require first the *clear* and *definite conception* of that idea in the mind of the composer—having with earnest and, at times, painful diligence entered into a severe analysis of the phenomena of febrile diseases. The principle recorded in our proposition was, we think, clearly and legitimately educed from a correct observation of these phenomena; and we now trust to that principle as the conception which is to guide us through this maze, confessedly the most intricate and bewildering in the whole domain of medicine. This shall be our *filum labyrinthæ*. Our profession has so long been in the habit of viewing the symptoms of fever in one indiscriminate tableau, that the picture now presented to the mind, on the very recalling of the word, scarcely admits of the idea of any legitimate isolation of the phenomena, even with a view to their systematic classification.[1] We admit that the long indulged habit has brought us to regard the mixed and blended phenomena of these diseases as an indivisible unit; but we have only to look into the recent progress of physiology to become convinced that every morbid manifestation is but the modification and consistent representation of some normal action of the system, and that as such, it must be referred to some particular and individual controlling influence, with which, when separated and carefully compared, it will be found most strictly to accord.[2] Our organs are so complex and multiplex, and the influences dominating them so inter-

[1] *Vide* Copland's Dictionary of Practical Medicine.

[2] "All pathological symptoms are only the phenomena of the physiological vital processes, under changed conditions."—HENLE'S *General Pathology*, p. 319.

volved, that an analysis of the associated results of even the most ordinary disturbances would, perhaps, surprise many who have never followed the drift of such an exercise into its etiological developments. Let us examine one or two of the ordinary occurrences of daily practice, in order to illustrate both our method and its legitimacy.

CASE 1.—A young man receives accidentally, from a particular direction, the charge of a pistol just above the zygomatic process of the temporal bone; he performs a few convulsive movements, and falls to the ground in syncope. He is carried to bed, where his constitution soon recovers from the shock. On examination, the eye first attracts attention; the conjunctiva is suffused with *tears*, and presents intense *ecchymosis* in a determinate and restricted region—this part we say is blood-shotten, the rest of the ball presenting its normally clear and white appearance. The eyeball has lost in a great measure its *motor* power, the pupil is immovably dilated, and the upper lid is found deficient in sensibility. In addition to this, the eye, though clear, is not in the slightest degree cognizant of visual impressions. There is also pain in the temporal region, recurring each night, and requiring at each return an opiate for its relief, that sleep might be obtained. In process of time, the blood-shotten condition of the eye subsides, the lid partially recovers its sensibility. He recovers the muscular movements of the ball to a certain extent; but the pupil remains widely dilated, and he has never since enjoyed a gleam of light in the eye of the injured side, though the organ has, otherwise than above mentioned, its natural appearance and functions. Could we desire a greater complexity of phenomena than we have presented in this case? Did any one now propose to separate and analyze these phenomena, it would be doubtless regarded as a curious and, perhaps, by some a *useless exercise;* but no one would deny that in order to analyze this intricate tableau of disturbances, it were legitimate, indeed necessary, to isolate them.

Let us, then, since the measure is a legitimate one, individualize the above phenomena, in order that we may develop the significance of each.

Even this will not be without its measure of advantage, in making clear our subsequent investigations; indeed we expect to analyze *many* cases having apparently a far less intimate connection with febrile diseases than the present one. This assemblage of pheno-

mena taken as a whole, without any correllation to the *physiological* facts, all well established, can only be characterized by the proper technicality, "a *gunshot wound* and its results," but when placed in philosophical relation with the truths evolved by experiment and previous observation, the significance of each, becomes pointed, and an extensive field of profitable discussion is opened up to our view. In this analysis, the examination of the CAUSE is expunged from the consideration, as this cause is fully recognized—known.

The phenomena are the following: 1st, involuntary movements; 2d, the fall. These we may refer to injury done either to some nervous centre, or to some trunk of a nerve near such a centre. From the nature of the phenomena, viz., aberrated voluntary movements or convulsions, we can only refer them to the cerebro-spinal system which, and which alone, presides over such movements. The fall is the result probably of the same disturbance in or near the seat of volition. 3d. The conjunctiva is found ecchymosed in a determinate region, and then a flow of tears. These last are neither sensory nor motory phenomena, like the last, but we find that they accord in their nature with certain results of experimental sections made by John Reid, Dupuy, Petit, and others, upon the *ganglionic* branches about the eye,[1] which were followed by "ecchymosis of the conjunctiva and a flow of tears." We must therefore refer these results to injury, either direct or otherwise, of certain branches or ganglia of the *secretory* system supplying the eye, and we may go further and decide that but a *small number* of branches is injured, because the blood-shot is *restricted* in its extent. 4th. The loss of *motion* in the *ball of the eye* we refer to injury of branches of the third, fourth, or sixth nerves—again, therefore, *cerebro-spinal* phenomena. 5th. The *paralysis* of the *iris* we must also refer to branches, probably, of the third nerve, which supplies *motion* to the parts within the globe of the eye and therefore cerebro-spinal; while 6th, the loss of *sensation* in the upper lid is due to injury received by branches of the cerebro-spinal fifth pair supplying that region. 7th. The loss of vision unattended by any injury to the eye itself, must be referred, under the circumstances, to some injury of either the nerve conveying (optic) or of the nervous centre receiving (tubercula quadrigemini, &c.) luminous impressions. These two last must therefore be considered as cerebro-spinal phenomena, for to this system, as we have seen, are referred all our

[1] *Vide* the previous pages of this essay.

æsthetic as well as sensory and motory endowments. 8th. But we have seen that there is *pain* attending this wound, and that this pain is *periodical;* we must refer this pain, of course, to the cerebro-spinal system, both because it *is* pain, and secondly, because it is periodical; for, as we have seen, "the normal life of the cerebro-spinal system is *periodical.*"[1] Thus we have by this grouping and analysis, brought the phenomena of a "gunshot wound" into connection with extensive and interesting physiological relations, and by this means, indeed given to this particular one, so to speak, both a definite and a complex *pathology;* whereas before, it was a matter of *naked cause and effect.*

CASE 2.—A child has accidentally taken an overdose of belladonna. The phenomena presented are absence of the secretions of the throat, a bright red flush over the cutaneous surface resembling scarlatina, difficulty in the muscles of deglutition, delirium, excessive dilatation of the pupils, a total suspension of the functions of external sense, sometimes convulsions and finally coma. In this case, we find most of the phenomena can be referred to the cerebro-spinal system, as: 1st. Difficulty of deglutition and the convulsions, showing deranged excito-motory action. 2d. Dilatation of pupils, paralysis of, probably, third nerve. 3d. Suspension of functions of external sense, delirium, and coma; these last referring to the *æsthetic* and intellectual portion of this system. But, two other of the phenomena above mentioned neither refer to sensation, motion, the æsthetic nor intellectual functions; we mean the *absence of secretions in the throat* causing dryness; and that *modification in the circulation* of the blood by which the skin assumes the *scarlet hue.* These two plainly refer to the ganglionic system of nerves which, we know, reigns throughout the realm of the secretory processes and the circulation. Thus we may say that the analysis of the phenomena of the above case has yielded to us the fact, that, belladonna in its action upon the nervous system (probably through the blood) manifests itself in two distinct, and totally dissimilar, sets of phenomena, the first and more numerous being in accordance with the character of action known to mark the *cerebro-spinal* system, while the second set are in strict accordance with the mode of innervation distinguishing the *ganglionic* or *secretory* system of nerves. And

[1] As quoted from Henle's General Pathology, p. 319, on former page of this paper.

let us say here, that whatever may be the phenomena, no matter how produced or in whatever disease presenting, these phenomena of the living organism can only assume the characters *of one or other of these two systems of nerves;* for they are all *guided* by them, and by them only. Each has its own peculiar method of guiding these phenomena, and each of these methods is so invariable with itself, and so dissimilar to each other, that there can never be the least difficulty in discriminating between them, let them be ever so multiplied and confused, as we shall endeavor to illustrate in the phenomena of fever.

From a consideration of the above two very dissimilar cases we find that it is possible to evolve *classes* out of a complexity of phenomena, which though totally different from each other, yet owed their existence in each case to a common cause, and in their manifestation were so intimately blended, that their dissociation seemed scarcely a legitimate measure. If it has been found advantageous thus to classify the phenomena in the above cases, we may reasonably expect to find a similar classification of the phenomena of febrile diseases to yield the most valuable results. When we consider that the following rather quaint description given by Dr. Fordyce of fever, with all its confusion, is still literally true, we can well estimate the difficulty attending an attempt at a classification of their phenomena. "Fever," says he, "is a disease which affects the whole system; it affects the head, trunk, and extremities; it affects the circulation, absorption, and the nervous system; it affects the skin, fibres, muscles, and membranes; it affects the body, and it affects the mind, it is therefore a disease of the whole system in the fullest sense of the word. It does not," he continues, "affect the various parts of the body uniformly and equally, but on the contrary, sometimes one part is more affected than another."

Scarcely less involved is the description of a more recent author.[1] "Fever presents during its whole progress characteristic symptoms, not consisting merely of an increased frequency of circulation and augmented heat, which are sometimes wanting in certain stages of the disease, but of other morbid phenomena that are equally important, that vary in degree and in modes of association with one another, and that superinduce other phenomena, thereby giving rise to the different forms and states in which the disease occurs. It commences," continues this author, "with debility and lassitude,

[1] *Vide* Copland's Dictionary of Practical Medicine, p. 1041.

which are followed by chills or rigors; it is generally composed of several invasions or exacerbations; it implicates the whole of the vital endowments and faculties, the fluids, and the entire organization; it is acute and dangerous in its course, with lesion of the circulation, with alteration of the animal heat, and of the secretions, and with diminution of vital power, and it is versatile as to its symptoms and type with efforts at sudden changes or crises." It is not, however, in these general descriptions of fever, but rather in the particular rehearsal and accurate representation of the phenomena, as observed in typal cases of the several forms of the disease, that we can find any clear idea of these distinctive phenomena. Each case of fever, it is true, presents its manifestations in a mixed and somewhat confused manner, but then, in typal cases of one or other of the great classes of fever, we find these symptoms so clearly and distinctly presented, that the confusion just referred to does not appear in the same degree. We will therefore here present a summary of the phenomena of each of the two grand divisions of febrile diseases, from which summary we will attempt their classification in accordance with the known and admitted truths of neuro-physiology.

CEREBRO-SPINAL FEVERS (OF MANY PAROXYSMS).

In what is termed by authors the *precursory stage* of fever, we find a great similarity in the manifestations; thus, shortly after the system has been brought under the influence of the morbific cause, we have constriction or oppression of the chest, or at the præcordia, sighing, gaping, and other indications of some energetic disturbing influence operating upon the nervous system; there is lassitude, there are pains, the pulse is weak and irregular, being accelerated on the slightest exertion. The secretions are even this early disturbed, as shown by the state of the tongue, the dry mouth, loss of appetite, and sometimes by a deranged state of the urinary organs. There are often a tender condition of the eyeballs and frontal pain existing for some time previous to the invasion of the paroxysm. There are also vertigo, headache, and a confusion of ideas. "His sleep is unsound and unrefreshing," says one author, "and he awakens with a sense of lassitude, or with pain in the back and limbs; in short, all the *cerebro-spinal functions* are either weakened or disordered." The pathological condition attending this stage is

a depression of nervous power throughout the frame, and especially that which pertains to voluntary motion, and there are slight congestions in the lungs, liver, spleen, and mucous membranes of the stomach and intestines. The blood when examined[1] has been found to present decided departures from the standard of health.

In what is technically termed by writers, the cold stage or the period of invasion, we find that all the above symptoms are aggravated; the lassitude becomes painful uneasiness; there are a great variety of indications of altered sensation, as formication, creeping chills, principally along the back and extending over the limbs and general cutaneous surface; respiration becomes irregular; there are gaping and sighing, and, sometimes, irritative cough, with stretching and a sense of weariness in the back and limbs, requiring a frequent change of position, and this finally on the increase of the chilliness, becomes exaggerated into regular jactitations of the voluntary muscles—true *spasmodic* actions, which are known as the "shudderings" and shiverings and "rigors," of what has hence been most appropriately termed "an ague *fit*." Accompanying these phenomena, we have often *intense pain* in some one or other region of the body; instead of tenderness in the eyeballs, there is severe aching which renders light intolerable. Or there may be pain in the chest or abdomen, or neuralgia in one or all of the limbs. In addition to all these symptoms, there is observed an extreme susceptibility to *sensory* impressions, and also great irritability of the voluntary muscular system, any attempt at their exercise, increasing the jactitation. The exercise of the will over the muscles is embarrassed by tremulousness and an irregularity of muscular action. The very stimulus of the attempt to exercise the will appears to excite involuntary action, as in cases of chorea. "There is the manifestation of the will; but of an ill directed and disconcerted will."

We find with the above symptoms of derangement in the sensomotory functions that various evidences of aberrated or arrested secretion present themselves; the cutaneous transpiration is arrested, the skin being harsh and dry, the pulmonary exhalation is much diminished, copious discharges of pale urine[2] take place, the salivary

[1] See Observations on Malarial Fever, by Prof. Joseph Jones. Southern Med. and Surg. Journal, 1858.

[2] "The depressed state of the forces, consequent upon the continued action of the malarial poison, is attended by marked diminution of the solid constituents of the urine." Observations on Malarial Fever, by Joseph Jones, M. D., Prof. of

and other buccal secretions are diminished, and the mouth, pharynx and tongue become dry; the tongue being still more thickly coated than before, with abnormal deposits. There is nausea, and if vomiting occurs, there will be evacuated often, large quantities of bile and other fluids from the stomach, not incident to it in a state of health. The *circulation* is everywhere embarrassed, as shown in the pallid and shrivelled skin—"cutis anserina"—lividness of the lips, blueness of the nails, and the pinched and ghastly expression of the countenance, together with the irregular and compressed pulse so constantly referred to as characteristic of this stage.

All the *pathological states* of the precursory stage are exaggerated in this cold stage, the slight congestions become alarmingly increased. The blood appears to be in a great measure in a state of stasis throughout all the organs in the thoracic and abdominal cavities; these viscera, viz: the lungs, spleen, liver, intestines, &c., presenting a condition of extreme engorgement in all those cases which have died in this stage, and undergone autopsic examination.

To the stage, just described, there succeeds a period of excitement, known as the *hot stage*, in which, with a disappearance of certain of the foregoing signs, there is an increase of those which remain with the supervention of others. Fever in its literal sense now begins and manifests its specific form. "We see," as described by various authors, "the gaping, pandiculation and rigors disappear, and the stricture and collapse of the countenance and general surface are followed by increased warmth and turgescence, the chilliness, however, continuing for a short time. Pulmonary transpiration returns in some degree, respiration becomes full and frequent, and the breath is hot. The urine is diminished and high colored, and its discharge is sometimes scalding. The muscular debility, the feeling of fatigue and lassitude, the intense pain in the loins and limbs, the thirst and the anxiety at the præcordia are all increased. The cheeks are flushed and the cutaneous surface generally is hot, burning and turgescent. The appetites are entirely abolished; the tongue is still more loaded and furred than before; the pulse is free, full and regular, and greatly accelerated, the action of the heart, bounding. There is pain in the head, giddiness, confusion of ideas, with occasionally delirium and a morbid susceptibility of the senses, at the same time often, moroseness, jactitation and extreme restlessness."

Chemistry, Med. College of Ga., Southern Med. and Surg. Journ., vol. xiv. p. 527. August, 1858.

This stage is finally succeeded by one of *decline*, in which all of the above symptoms gradually subside; that is, the pain disappears, the muscular fatigue is also gone, there is no longer any aberration of temperature or of sensation, the condition of the secretions is nearly up to the normal standard, and a profuse cutaneous transpiration, which is almost invariable in this period, has given to it the name of "the sweating stage." The patient, it is known, now for a period, returns to nearly the condition of the organs and their functions preceding the attack, and in certain instances appears to have regained his ordinary health on the subsidence of this first paroxysm of fever. This period of respite is the intermission, at the end of which, the whole train of phenomena recur in nearly the exact order above recounted, and so on with repeated paroxysms, the strength of the patient may become entirely exhausted, and the repeated *temporary congestions* described above, are apt to result in *permanent engorgements* which interfere with the processes of life, and which are known to lay the foundation of many grave and often fatal diseases, either manifesting themselves locally, or by such as indicate a depraved and vicious condition of the fluids, as shown in the œdemas, dropsies and dyscrasias, which are so often the sequelæ of paroxysmal fevers. We must here refer to the valuable researches of our friend and colleague Professor Joseph Jones,[1] on the changes which take place in the blood and other fluids of the body, during the existence of malarial fever. After giving in tabular form the results of many analyses of the blood, Dr. Jones remarks: "This analysis confirms the statement that the *malarial poison* (either directly or indirectly) *destroys the colored blood corpuscles.*[2] They are diminished one-half, the dried corpuscles being only 73.405, and the moist corpuscles 293.620, whilst in health, the dried corpuscles generally average 135.000, and the moist corpuscles 540.000." We may refer more particularly to Dr. Jones' researches in the subsequent portions of our paper.

In the above *resumé* we have endeavored to sketch compendiously, though comprehensively and fairly, the multitude of phenomena which present themselves in the course of an attack of paroxysmal fever. Our sketch more fully represents that type of the disease known as *tertian fever*, and we have allowed our

[1] *Vide* Southern Med. and Surgical Journal, vol. xiv., 1858. Article, "Observations on Malarial Fever."

[2] Italics are ours.

description so to present itself, inasmuch as this is regarded as the typical variety of all paroxysmal diseases. It occupies the most prominent and elevated position; the others falling off, as it were, on either side; first on one side resembling less and less fever at all, and partaking more of the character of the simpler *neuralgias;* or secondly, on the other side, running too deeply into the secondary organic disturbances, the febrile phenomena, as arterial excitement and deranged secretions, approximate them too nearly to the continued forms, and render them not the most suitable for our purpose of illustration, though perfectly within the bounds of the clearest theoretical consistency.

Of all these complex and intervolved phenomena above recounted, it would at first sight appear a difficult task to make any satisfactory classification. But with the clear and well defined idea that "all the normal phenomena of the living organism, in both health and disease, are but manifestations of nervous action, either normal or aberrated," ever present in our mind; and also with the fact before us, that as there are *but two* grand departments of this nervous system revealed to us by physiological science, viz: the cerebro-spinal and the ganglionic or secretory, each presenting the most marked and diverse peculiarities, we must, therefore, conclude that whatever jumble, the phenomena of fever may present, *each phenomenon must necessarily refer to one or the other of these two systems of nerves.* It *must be* either that of a sensory, a motory, a sensomotory, an æsthetic, or an intellectual aberration of the *cerebrospinal* system on the one hand, or one of circulatory, secretory, nutriental, or vaso-motory aberration on the other, of the *ganglionic* system. With this principle, then, we may proceed by a simple process of selection to arrange the phenomena under the respective heads indicated in our Propositions I. and II.

In making now the distribution of the various phenomena, it will not be necessary to name each symptom separately, and, therefore, to avoid tediousness we will state them under particular heads, thus: We find, FIRST, *aberrations of sensation;* pain in the forehead and temples, thorax, loins, and extremities; there are muscular soreness and neuralgic sensations everywhere; again, we have creeping sensations of chilliness, formication, &c. Then there is modified innervation in the nerves of *special sense*, as of taste, vision, audition, &c., and of the *intellectual* organs which pertain, of course, likewise to the cerebro-spinal system, as the cerebral excitement, delirium, coma, &c., so uniformly observable in the graver, and

often to a certain degree in the milder forms of paroxysmal fever. SECONDLY, *aberrations of motion;* thus, first, here we observe prominently the muscular jactitation and tremulousness during the chill; these are most marked excito-motory phenomena in the early stage of the paroxysm. To these may be added the muscular malaise, pandiculation, and general restlessness seen throughout the attack. Certain other facts, to be mentioned hereafter, which will show that neglected intermittents finally cause paralysis, first of sensation, and secondly of motion, will greatly enhance the significance of these two classes of phenomena now indicated. The gaping, sighing, and irregular respiration may also be referred to the cerebro-spinal system, viz: the upper portion of the spinal cord. But above all these special indications of the cerebro-spinal character of the innervation dominating the senso-motory phenomena of the intermittent paroxysm, is the prominent and significant fact that they are all presented *in a periodical manner;* even in this state of disease, it is plainly recognizable that, "the life of the cerebro-spinal nervous system is *periodical.*"

The above are undoubtedly cerebro-spinal phenomena, and in accordance with our commonest ideas of neuro-physiology can be referred to no other portion of the nervous system; but there are other facts presented in a paroxysm of these fevers, which we have termed "*cerebro-spinal,*" which do not refer at all to the cerebro-spinal system, and which, moreover, cannot under any circumstances be *directly* attributed to it. We refer to that large number of phenomena indicating aberrated *circulation and secretion.* These are: 1stly, the pale and shrivelled condition of the skin, then its flushed or its purple appearance, the blueness of the nails, the injected and watery condition of the eyes, the foul secretions upon the tongue and within the mouth, the congestions in the lungs, liver, spleen, stomach, and sometimes in the intestines; the *altered secretions* in these organs during the attack, as indicated by the profuse discharge of bile and the frequently changing character of the *urinary* secretion,[1] even during the progress of a single paroxysm; 2dly, and *distinctly,* the exalted *temperature—calor mordax* of these fevers, burning the hand when applied to the surface, is most pointedly significant of *ganglionic* nervous action, and most strictly in accordance with the results of those experiments adduced and the physiological data presented in the earlier part of this paper.

[1] See Dr. Joseph Jones, Observations on Malarial Fever, loc. cit.

And 3dly, we would still adduce other facts which at first sight appear to, and have for years very effectually served to impair the credit of the doctrine of the cerebro-spinal origin of paroxysmal fever; and we now mention them that all the facts, whether for or against the pathology we advocate, may be fairly and unreservedly presented, viz: the pathological condition, as engorgement, congestion, &c., in which the organs themselves, lungs, liver, spleen, and hollow viscera have been found, whenever autopsic observation has been allowed opportunity. The altered condition of the blood may also be said to have been a "stumbling block to the faith" in the cerebro-spinal origin of paroxysmal fever.

All of the above phenomena, we must immediately recognize, are such as would never be referred to the cerebro-spinal system; none of them are sensory, motory or excito-motory, but they belong entirely to that realm, where reigns in exclusive dominion an entirely different power, the *ganglionic* system; and, therefore, to that, and to that alone, can we look for any *direct* agency in the bringing about of all these truly ganglionic or secretory phenomena.

How then, it may be asked, with all these facts before us, indicating ganglionic or secretory aberration, can we persist in stating that the efficient cause of paroxysmal fever acts primarily on the cerebro-spinal system? We answer that it is by the conciliation of these very adverse and apparently contradictory facts, whose stubborn significance has almost destroyed the neuro-pathic theory of fevers, that we expect to transfer this valuable doctrine "from the domain of *doubtful knowledge* to that of *inductive certainty*."[1]

We have said that, "in cerebro-spinal fevers, there are modified sensation, intense pain, and other symptoms allying them to neuralgic and convulsive diseases." To satisfy this assertion, it will be necessary to enter somewhat at length into the consideration of these fevers, in such a relation as will substantiate its truth.

About the middle of the eighteenth century, Casimir Medicus observed such close analogy between the phenomena of paroxysmal pyrexia and those of periodical neuralgia, that he was induced to assimilate the two forms of disease, and to divide them into two classes, viz: those known as "intermittent pyrexiæ" and "intermittent apyrexiæ," strongly allied to each other by many affinities,

[1] *Vide* Whewell's History of Inductive Sciences, 3d edition, vol. ii. p. 304. Comparison of Berzelius and Faraday.

but almost identical in the one prominent characteristic of *paroxysm*. Since that time, this similarity of origin and probable identity of location, between neuralgia and intermittent fever, have been noted with more or less accuracy, and the arguments growing out of the various appreciation of the observed facts have met with every variety of success, and have undergone *every phase of modification*. At the present day, whether the fact is admitted or denied theoretically, certain it is, that in our application of therapeutic agents, the analogy in the phenomena of the two genera has so fully influenced us, that the specific anti-periodic febrifuge is now fully admitted to be likewise equally anti-periodic in the cases of neuralgia here referred to. The common points of analogy between the two classes have too often been fully discussed, for us to enter into their consideration in this place. Some of these are the following: 1st. They both occur in individuals subjected to the same influences, viz: exposure to marsh miasmata, etc. 2dly. They both manifest their phenomena paroxysmally, and are alike subject to hebdomadal relapses. 3dly. They both indicate *aberrated cerebro-spinal innervation;* and lastly, they are both with almost equal certainty, ordinarily arrested by the application of the same anti-periodic treatment, viz: the preparations of cinchona, arsenic, cold effusions, change of air and scene, tonics, revulsives, etc. As remarkably illustrative of the close alliance between paroxysmal fever and neuralgic affections, mentioned in our proposition, we ask to record the following case, which will doubtless suggest the recollection of similar cases to many of our readers who have been located in malarious districts.

CASE 3.—J. E. B., a gentleman of much intelligence, especially in reference to the facts concerning his own case, is of marked nervous temperament. He applies to us for relief in a peculiar condition of the nervous system; on examination, we find that the case presents the following phenomena: There is diminished sensibility in the cutaneous surface, from a line about level with the eleventh dorsal vertebra, which insensibility gradually increases, as we extend our examination toward the lower extremities, until arriving at the feet, the paralysis of sensation is very nearly complete. Pinching, rubbing, or pricking, produces little or no pain. His lower extremities, he says, "feel like dead clogs" from the knees down. He is able to walk, but progresses with an uncertain gait, his steps evidently lacking that precision necessary to steady loco-

motion. Each step must be directed *by the will*, and the will, is in every particular, instructed in his case solely by the eye; thus, while walking along the street, should any object suddenly or strongly arrest his attention, so as to divert either the effort of his will, or cause him to take his eyes off the pavement, he immediately begins to stagger, and unless efficient support is afforded him, he will fall before he can regain, by the exercise of the will, that co-ordination of the muscles necessary to regular locomotion. Should he close his eyes while walking, he is in immediate danger of falling. Sitting in a chair with his eyes closed, being directed to raise one of his lower extremities and to move it from side to side, he performs the act with precision, so long as his eye is upon the limb; but on closing the eyes there is no certainty whatever in his movements; to use his own words, he "cannot tell what direction his limb is taking." Yet we are astonished at the amount of *muscular* power exhibited by this delicate man, in raising the limb and in keeping it in that fatiguing position for the considerable time during which we prolonged these experiments. Again, should anything occasion him to get out of bed in the night, the act is executed without inconvenience, if the lamp, habitually kept in his chamber, is burning, but on several occasions, he had to rise when this lamp had been accidentally extinguished; at these times he would get out of bed as usual, but would invariably *fall down*, the contact of the feet with the floor failing to inform the muscles when he had reached a surface of support.

The above, and many other similar facts, the detail of which could not more fully establish the necessary conclusion, serve to indicate most plainly, that he has suffered loss of sensation in the lower extremities, and as a necessary consequence, with the loss of this element of reflex action, that excito-motory function so necessary to ordinary walking and standing, is entirely null, and the active exercise of the will, therefore, has become at every moment necessary to their successful performance.

On examining the upper portion of the spine, we find near the middle of the dorsal region, slight *tenderness*, which increases as we ascend, for several vertebræ, when the spine manifests no longer any tenderness on pressure. His digestion is somewhat deranged, and his appearance indicates an impairment in the health, or stamina of the blood—the pallor of his lips, tongue, and cheeks, evincing a probable deficiency of iron; otherwise, his general condition presents nothing remarkable.

The above is an accurate description of the case as observed in our first interview with the patient, when from him we received the following history:—

Having, in the spring of 1843, purchased a residence on the east side of the Savannah River, about one mile from Hamburg, he became much interested, during his leisure hours, in improving the land adjacent to his dwelling. His men were employed in ditching a broad surface in front of the house, which was then a sheet of standing water, with much decaying vegetable matter in it. The exigencies of his business allowed him to be with those workmen only during the morning, from 5 or 6, to 8 or 9 o'clock, and again during the evening, for about the same length of time. While thus engaged in superintending the reclaiming of this land, our patient became the subject of paroxysmal fever, of tertian type. There was nothing remarkable in his attacks, except perhaps the unusual amount of *pain* experienced in the back, loins, and inferior extremities, during the paroxysms. He continued to experience hebdomadal relapses for nearly two years, the attacks returning at intervals varying from one or two to four weeks, and always yielding readily to the administration of quinine. At first these invasions were always attended by the usual *visceral derangements* of paroxysmal fever; but at the end of about eighteen months, these disturbances were less manifest, and the neuralgic character before adverted to, became more prominent, till finally, in four or five years, the disease observing still its hebdomadal character, the paroxysms appeared to be simply attacks of neuralgia with an accelerated pulse, without apparently any marked organic disturbance. Each one of these paroxysms left the nervous system somewhat enfeebled, but it was always prevented from repeating itself during the same attack, by the prompt administration of quinine. Indeed, so regular were these returns, that the patient could frequently forestall even the first paroxysm by the timely administration of the remedy, on calculating the period. By this means, much of the suffering had been avoided.

Strange to relate, our patient continued to reside in this malarious locality, in the valley of the Savannah River; and stranger still, seldom thought of appealing to any more permanent remedy for relief than that afforded by quinine. His sufferings became more and more unendurable, and during the next five years, his symptoms became very alarming. In the year 1850—in addition to the attacks of neuralgia—some of the nerves of *special sense*

began to be affected; he became the subject of partial amaurosis, portions of the retina having become uncognizant of light, causing him to fail in seeing objects, except in a particular direction. Alarmed at these symptoms, he abandoned the engrossing and confining pursuit in which he was engaged, left home, and subjected himself for some months to the treatment and regimen of a hydropathic establishment in one of the Northern States. Here, all his alarming symptoms disappeared, together with the neuralgia, and for nearly a year after the treatment, he considered himself well. He returned, however, to his old location, and was again exposed to the influences giving rise to his disease, and since that time has suffered from repeated attacks of neuralgia, alternating occasionally with paroxysms of fever.

For about a year past, he has observed the increasing numbness of the lower extremities, which at first did not show itself, in any marked degree, except immediately after the attacks, but which has subsequently become more permanent, till at present it is adequately represented in the description given at the beginning of the case.

We had the opportunity of witnessing but one of these attacks. We found the patient with a moderately warm skin, pulse 100 beats per minute; countenance composed, and he seemed willing to engage in conversation; but at intervals of every two or three minutes, his face would evince intense suffering, and the limb of the left side would be suddenly drawn up, while the chest would be thrown forward by a violent spasm, strongly resembling emprosthotonos. These were but short, though varying much in both their duration and violence. On the occasion here mentioned, we had been sent for by the patient that we might observe the character of the paroxysms, and also that we might advise in relation to his continuing the use of morphine, which he said was the only article which afforded any relief during the paroxysm. When the pain was arrested, the convulsive phenomena, which were provoked apparently by it, did not present themselves. For two days following, the patient, as he had frequently done before, took freely of the sulphate of quinine, and he had, at that time, no return of the paroxysm. We here mention in passing, that the patient was strongly advised to seek a more salubrious atmosphere—to resort to the daily application of cold shower-baths—indeed to return to the hydropathium; to use revulsives, in the form of dry cups and blisters to the lower portion of the spine. As an internal tonic, he

was recommended to take, tentatively, the compound syrup of the hypophosphates of lime, soda, potassa, and iron, recently so rationally recommended by Dr. Churchill,[1] in scrofulous diseases, and by Dr. Samuel Jackson, in certain nervous affections. We also advised the continuance of the quinine, as heretofore, to break up each particular attack; and, further, that should the quinine fail, he should use arsenical preparations, as Fowler's solution, &c., to prevent their return.

He is at present pursuing the treatment in a healthy locality, and his improvement is well marked and encouraging in every respect. The paroxysms are less frequent, and less severe when they occur. His general health has much improved, and the paralysis of sensation has much diminished, now being almost entirely confined to parts below the knee; his gait is also more steady, he being better able to co-ordinate muscular action.

Above, we have given at considerable length the details of a case of neuralgic derangement, which, from its inception to the present time, embraces a period of about fifteen years.[2] Arising under circumstances, and in such influences as ordinarily give rise to paroxysmal fever, we find it in the beginning a well-marked case of ordinary tertian intermittent, complicated with the organic derangement, and other ordinary concomitants of this very common affection. Having been neglected, and the patient continuing to reside in the atmosphere which gave rise to the disease, this case, as frequently occurs, assumed a chronic character, but now persists more under the form of a neuralgia, than of an ordinary fever. It could no longer be suspected of being any one of the phlegmasiæ. During this persistence under the form of neuralgia, we find regular intermittent *febrile* attacks, alternating with the *neuralgic* paroxysms; and we also find that the neuralgic paroxysms simulate in every possible respect the febrile ones, observing the same hebdomadal returns, continuing the original tertian type, and yielding, like the

[1] On the Proximate Cause and Specific Remedy of Tuberculosis, by Dr. John Francis Churchill.—*Dublin Hospital Gazette*, Aug. 15th, 1857.

[2] This duration appeared to us somewhat remarkable, but on reference to Prof. S. H. Dickson's excellent work, *Elements of Medicine*, we find the following statement: "Intermittents are noted for the manifestation of a strong tendency to recur, fixing themselves on the constitution with all the tenacity of habit, and resisting for great lengths of time, every effort to expel them. The quartan is most remarkable for this obstinacy. I have myself known it to continue for fifteen years, and instances are recorded of its duration extending to twenty-four, and, as Good states, even forty-eight years."

febrile disease, to the action of quinine. And finally, in the above case, we see that the repeated attacks of neuralgia have been followed by paralysis of sensation, and even since the paralysis of sensation has supervened, the patient still is subject to paroxysms of neuralgia, which have recently been complicated with *convulsive* phenomena in certain muscles of the trunk and lower extremities.

There are doubtless many analogous cases reported, and multitudes of them occurring daily under the eye of the practitioner which would serve our purpose nearly as well in showing how closely paroxysmal fever is allied to neuralgic diseases. The above, however, may have the advantage of presenting a greater variety of phenomena to illustrate this alliance, than any one case which has occurred to us, either in our research or in practice.

To our mind, the case, as it at present exists, seems to be one of the *pure paroxysmal neuroses*, which intermittent fever essentially is, unmasked by the organic disturbances which ordinarily accompany it, and which, we hope hereafter to show, *secondarily result from it.*

But we have said that the symptoms of CEREBRO-SPINAL FEVERS ally them not only to neuralgic diseases, but to *convulsive* diseases likewise. It will be observed in the above report, that we accurately describe one of the paroxysms as being attended with involuntary muscular contractions very analogous to the convulsive movements of tetanus. This fact to a certain extent will corroborate our statement, but we are unwilling that the assertion made in our proposition shall be left unsatisfied by further observation and more elaborate discussion. It having been our duty to argue this part of our subject on a former occasion, we here present such extracts from the remarks then made, as we think may strengthen our present position. In the following article, published nearly ten years ago,[1] it will be seen that we have not only asserted that cerebro-spinal fevers and convulsive diseases are "strongly allied," but that we have endeavored to show conclusively that, in certain cases they are *identical.* The main object of the paper is to advocate the administration of quinine during the convulsion, and especially to prevent its return; which return is to be as confidently looked for as that of ordinary intermittent. Still, as the precept is based upon the *identity of the convulsions and the chill*, we deem it

[1] *Vide* Southern Medical and Surgical Journal, vol. v. new series, p. 591, article, Infantile Paroxysmal Convulsions, and their Treatment with Sulphate of Quinine, with cases, October, 1849.

not inappropriate to introduce the cases in this place with a considerable portion of the remarks:—

"From an attentive observation of many cases which our locality so abundantly affords, we are disposed to an opinion, varying somewhat from that inculcated by most reports, concerning the *time* of the occurrence of the infantile convulsions of intermittent fever, viz: that they more frequently than otherwise, if not invariably, occur in the beginning of the paroxysm or during the chill, and not at the acme of fever; and, consequently, they are not the result of a high degree of vascular excitement as has been, I believe, generally supposed. Now it is common to find them coming at a time when there seems to be least disturbance in the nervous or vascular system; for instance, a child is playing or running about apparently well, when suddenly it is attacked with a violent convulsion,[1] often with others succeeding, and after their subsidence, the case will be found to assume all the features of an ordinary intermittent paroxysm, progressing regularly on to intermission, &c. Indeed, the *convulsion seems to take the place of the cold stage* and is, so to speak, *a chill very much exaggerated*,[2] that is the *normal innervation which in a subject less favorable would have produced only* A CHILL, here in the extremely mobile and impressible nervous system of a child, gives rise to phenomena of a graver and more alarming character, and the paroxysm is *ushered in* by a CONVULSION. We would here advert to an example which may be considered a transition case between the *chill* and the convulsion, and develops to a certain extent our view regarding the *character* of the convulsion and the relation it bears to the paroxysm. E. P., a young woman of nervous temperament, and general bad health, aged about 22 years, on the advent of her second paroxysm was affected with involuntary contractions in the muscles of the arms and legs. I would not be misapprehended; *these were not the quakings and subsultus of an ague*, but of such a marked character as to assume decidedly the *form of a convulsion;* but not to the extent, however, of the deprivation of consciousness. She was fully aware when they were about to commence, and would call to her attendants for assistance in preventing their accession. Here the ordinary ague-shaking was

[1] Even while engaged in transcribing this sentence, I am called to the child of a professional friend, which child has had one convulsion, taken while in excellent spirits, and playing about the room. This evening is the time of the expected return of the paroxysm, it having had one on yesterday afternoon.

[2] The Italics are introduced in transcribing for the present paper.

evidently exaggerated into a true convulsion. On examination by pressure of the spine, we found the dorsal and lumbar regions extremely sensible. On the removal of sinapisms from the legs (where they had been very irrationally applied) to the spine, the convulsions were relieved in a short time, and the administration of quinine, during the intermission, prevented the return of the paroxysm. As the spinal irritation was of long standing, it was deemed expedient in this case to apply a blister as a more permanent revulsive.

"Thus fully impressed with the analogy between the cold stage and the convulsion, and having in a few instances succeeded in arresting the progress of a paroxysm by the administration of quinine, even after the commencement of the chill, and finding also that even when it did not entirely succeed in arresting the paroxysm, it generally mitigated its violence, thus disproving the gratuitous and pernicious dogma, that where quinine does not cure it makes worse. We have been induced to use this remedy empirically in several obstinate cases of infantile convulsions of this character. While we report them with some degree of confidence, as suggestive of *experiments* worthy, perhaps, of further investigation, yet we will not admit for the practice anything like established merit, as the cases are too few to deserve more than the credit, perchance, of exciting *inquiry* into the value of the application.[1]

"In the relation of the following cases we have not deemed it necessary to recount minutely the history of each, as they are in most respects but ordinary cases of intermittent fever, and the history of one of them is but the prototype of the others.

"CASE 4.—H. H., a boy aged two years, had had a paroxysm of intermittent fever previously. While playing about on the floor, he was seized with a convulsion, which was quickly succeeded by others, which resisting the ordinary means used for their relief, we resorted to the administration of quinine two and a half grains every hour, till seven and a half grains were taken. The convulsions subsided after the second dose. The calomel previously given acted upon the bowels, and the return of the paroxysm was prevented by quinine given in anticipation next day.

[1] The hesitation here expressed ten years ago, no longer exists with us, as the treatment has been found perfectly successful in the hands of a large number of our professional friends as well as in our own subsequent practice.

"CASE 5.—Edward Bleese, aged about 6 years, had been the subject of tertian intermittent fever for a week. We were called to see him in a convulsion which came on at the beginning of the paroxysm. When seen, he had had many convulsions. The bowels were emptied by oil and enemata; mustard plasters were applied to the spine, abdomen, and extremities, without exerting any controlling influence on the convulsions. The convulsive action was almost incessant. Ten grains of quinine were administered at a single dose; in about an hour after, the convulsions became less frequent, and, finally, entirely subsided. The succeeding paroxysm was met with quinine, and the patient was afterwards treated for worms with very abundant results.

"CASE 6.—A. McGraef, a boy of very delicate and unhealthy appearance, aged about 12 years, was seized with a convulsion on the accession of his third or fourth paroxysm. He had had no treatment previous to this call. Dr. J. L. Watkins, then our pupil, attended the case, and having applied the usual routine of remedies, as sinapisms, enemata, pediluvia, &c., the following dose was administered: Quinine gr. x; calomel gr. xv. The mustard plasters, pediluvia, &c., were continued with the application of cold to the head, and five grains of quinine were given in an hour after the first dose. The convulsions ceased in about half an hour after the administration of the medicine. The sweating stage quickly succeeded, and on the next day the boy was apparently as well as ever. Of course, more than the ordinary caution was observed to prevent another paroxysm by the administration of quinine on the next day.

"We also constantly remark, that these convulsions are found to attend the *hebdomadal relapses* of the paroxysmal fever, upon which they depend, as the following case will show:—

"CASE 7.—S., a child, aged 2½ years, of excellent general health and ruddy appearance, was taken at the first paroxysm with a convulsion, while apparently quite well. When we saw this case, the convulsions had continued for more than an hour, with but short intermissions. After ascertaining that the child had not lately taken any crude ingesta that required removal, we administered of hyd. chlor. mit.[1] vj grs., quinine viij in one powder. The convulsions

[1] We feel it incumbent upon us to apologize for the sins of our early practice. Ten years ago large doses of calomel were regarded by many as necessary in the

ceased in an hour after this dose, and on the operation of the calomel the fever subsided and the case regularly proceeded through the phases of an ordinary infantile intermittent, and was subsequently treated accordingly. *In about three weeks after, a relapse occurred attended with convulsions.* The quinine was given in a single dose of five grains in combination with calomel. The cold douche to the head and sinapisms to the spine were also applied. The quinine was here given earlier, and the case was of shorter duration than before.

"We could here advert to other cases; one occurring under the observation of our friend Dr. L. D. Ford, of this city, wherein the hebdomadal returns of the paroxysm are invariably with a convulsion in its approach; and another similar one in our own practice, wherein, the administration of minute doses of Fowler's solution in the interval, prevented the paroxysm and the attending convulsions, but our limit will not admit of their full report." The case here referred to, continued for nearly six months, and under the use of arsenic and the bitter tonics, the attacks became milder at each hebdomadal period, but the convulsive tendency would show itself at these stated intervals, long after the other phenomena of fever had ceased to appear.

We will here introduce a case kindly furnished us by our friend and relative Dr. Edward A. Eve, of Richmond County, in this State, which case, unfortunately, strongly proves that while the proper administration of quinine will prevent the return of the convulsive paroxysm, its omission may be attended with the most disastrous consequences, proving conversely the correctness of our views, in regard to the identity of the nature of the convulsion and the chill.

CASE 8.—C. J. was a little boy, aged 4 years, residing with his parents in a paludal region on the confines of Burke and Richmond Counties, in this State; his father being engaged in carrying the Augusta and Savannah Railroad through this unhealthy region. Dr. Eve was called to see him in a convulsion, which occurred without any previous paroxysm of fever. He had many violent convulsions during the afternoon, but they were finally arrested by

treatment of paroxysmal fever. Since our views of the pathology of these fevers have become confirmed, we rarely administer *any* active cathartic, and scarcely ever, under any circumstances, do we regard a dose of *calomel* necessary in any stage of the treatment of paroxysmal fever.

the free administration of quinine, and this first paroxysm of fever proceeded to its termination regularly, ending in the sweating stage. Dr. Eve, who had often expressed his coincidence with our opinion of the pathology of these cases, on leaving, advised—indeed insisted—that quinine should be freely administered on the next day, beginning very early in the morning, to be continued until ten grains had been taken. Returning on the next day at 12 o'clock, he found the child out of bed and dressed, and apparently as well as ever. Supposing the quinine had been given, he congratulated himself on the probable escape of the child from the convulsion, and asked the parents how many powders had been given; when to his horror, they informed him that the child had appeared so well all the morning, that they "had considered it unnecessary to give him physic," and with the consent of a neighboring physician (who was also in attendance upon the case), they had withheld it altogether. Dr. Eve insisted that they should immediately give a double dose, and they proceeded to prepare it, but before it could be administered, this beautiful[1] and apparently healthy child was seized with a convulsion more violent than those of the preceding day. This was rapidly succeeded by others, and he died in a few hours, even before the Doctor left the house, thus affording a most melancholy proof of the ample grounds of his solicitude, and thus also as we have just said, substantiating the correctness of our views in regard to these convulsive concomitants of paroxysmal fever.

In the progress of inductive science, it seldom happens in any department, that *all* the materials for the generalization occur to us at once; but a single element is first supplied, and then another, till finally, after a long period, perhaps, the arch is completed by the chiselling out, as it were, of some important kindred principle which is to form the keystone, giving strength and support to all the rest, in the construction of a consistent and symmetrical system. To a certain extent, this idea will apply to the introduction here of our previous publication on this special part of our subject. Having so long ago, thus decidedly committed ourself to the opinion that the motory phenomena of "infantile paroxysmal convulsions," as we even then termed them, were but the same phenomena of the chill exaggerated, or in other words, that these two classes of motory phenomena were identical, "the *convulsion* being merely an *exagge-*

[1] This child was a year before, our own patient, the subject of the operation of lithotomy, from which he rapidly recovered, evincing much vigor of constitution.

rated chill," further argument on this point becomes in our opinion unnecessary. We will, however, further add, that our own experience and observation of the ten years past, since the above communication, besides that of many professional friends, have served but to confirm the opinion then promulgated, both as to the nature of the phenomena, as well as to the importance of the administration of quinine in the treatment of such cases.

From a consideration of the above facts, we think that few will be prepared to deny that portion of our Proposition III., in which it is stated that certain of the symptoms of cerebro-spinal fevers present phenomena "strongly allying them to both neuralgic and convulsive diseases." Should any one still feel disposed to dissent from the proposition, we confidently refer to the records of medicine since the days of Casimir Medicus, our first authority (so far as regards neuralgia), to the present time, and, with this guiding thought to lead him, he will everywhere find abundant testimony to the truth and universality of the principle.

We have said that, for centuries back, and more particularly since the days of Boërhaave and Cullen, a great number of authors have recognized that certain phenomena of febrile diseases are referable to the nervous system; among these we may mention the names of Borelli, J. P. Franck, Fodéré, Giannini, Gorget, Alibert, Rayer, Teale, Bricheteau, and a great number of others of a later date, but prominent among those, who in *modern times* have committed themselves decidedly to the definite opinion that paroxysmal fever has its primitive location *in the cerebro-spinal centres*, and that to the lesion there existing most of the characteristic phenomena may be rationally referred, we find on an impartial research, that there are two writers, whose views, though coinciding with remarkable agreement, yet made their observations independently and published them, though at the same time, 1836, yet in far distant quarters of the globe.

In the *Southern Medical and Surgical Journal*,[1] for November, 1836, we find a paper entitled: "Remarks on the Pathology of Intermittent and Remittent Fever. By Lewis D. Ford, M. D., Professor of Chemistry in the Medical College of Georgia." In this article, the writer plainly announces the identity of the pathology of intermittent and remittent fever, and finally reasoning clearly and philosophically from a series of most carefully observed facts, locates that pathology

[1] Vol. i. Old Series, p. 335.

primitively in the axis of the cerebro-spinal system. From this paper we quote somewhat at length, in justice both to our subject and for the proper adjudication of merit to a friend, whose claims are not perhaps abroad, so fully known and acknowledged as they are at home.

"I have united," says our author, "these two forms of fever in the following remarks, because of the striking resemblance of their features generally, and under the conviction of the great similarity, if not identity, of their pathology. They resemble each other strikingly in the symptoms, precursory of the formal attack, and in the first distinct paroxysms so closely, that the most expert observer will not pretend to foretell which of the forms the disease will subsequently assume; also, in the progression of the symptoms of a paroxysm, and in its duration. We infer their general similar nature, further, from the fact of their simultaneous appearance in different individuals, under similar circumstances of exposure, and from the fact that they mutually run into each other.

"Taking it for granted that they both arise from an external cause—which cannot be doubted—whatever difference of opinion may exist as to what that cause is, what it should be called, &c., the question naturally occurs—Can we render an account of the fact that, under the agency of this individual cause, one form is determined in one individual, and the other in another? for, if we can, we may be confirmed in the opinion of their general similarity, and deduce from this explanation some useful practical directions. On exposure to this external cause, an individual suffers a regular paroxysm of fever. After a certain intermission, comes another and another; we may infer that the cause, at the moment of becoming efficient in producing each paroxysm, finds the organs of the system generally in the same state, as at the commencement of the first; or, if previous paroxysms had produced alterations in some of them, they are not such as to counteract the regular succession of the phenomena of the paroxysm. But, while under the same external circumstances this case becomes remittent, when we will generally be able to discover some physical or functional signs of disorder of some of the organs of the head, chest, or abdomen; this morbid change—at first slight—not of a degree to produce danger, under a state of quietness approaching to that of health, but liable to be increased to a dangerous degree by the agitations of succeeding paroxysms; and it is a matter of observation, that if these superadded disorders of the organs be not relieved, they

are increased by every succeeding paroxysm, and disturb more and more the regular periodicity of the fever, which, in its progress to a fatal termination, exhibits more and more distinctly the marks of this local affection. Hence we conclude, that if of two individuals under similar exposure, an intermittent be determined in one, and a remittent in the other, that there is some visceral irritation in the last, either pre-existing the attack, and increased by it, or altogether determined by the first paroxysm itself, and that as long as the fever preserves its periodical character, even in this modified degree, it does so under the influence of the same organic condition on which the perfect and regular periodicity of an intermittent depends."

"What, then, is the pathology of this intermittent fever? which from the time of the earliest records of medicine, to the physicians of all ages, has presented in its different forms, one unvarying character—a character so uniform, that the description of the simple disease by Hippocrates, would graphically represent those cases seen by ourselves. For it is worthy of remark, that the practical history of intermittent fever was *perfected* by Hippocrates himself; that is, its external developments accurately marked—and even the names of its various forms imposed by this great father of science, are retained to this day. The question, then, as to the pathology of *this* disease, becomes one of peculiar interest to the philosophical physician, since, from its uniformity, it has presented a subject so favorable for investigation—allowing the science of each succeeding age to hold fast, and establish those principles as to its nature, which were true, and gradually to discard those that were erroneous. In this point of view, its history is calculated to illustrate the powers and resources of the science. It would be interesting to trace its history, and to connect the opinions entertained as to its nature, with the prevailing philosophy of the most prominent systems; for the fact that we do not now understand its pathology, is well calculated to produce doubt as to the certainty of the science of medicine, after all the confident and boasted pretensions of these various systems to have explicated its nature; while doubt will be removed by the conclusion to which we must necessarily arrive, that the science has not attained to this knowledge of its nature, because of the defective modes of investigation.

* * * * * *

"The severe medical philosophy of the present day basing itself upon the principle which lies at the foundation of both

the science of physiology and pathology—that there is no action of the human system, healthy or morbid, that does not result from the application of *material agents* acting upon the tissues of the system; rejecting with utter abhorrence the agency of any of the former fanciful abstractions, refusing to spend its high powers in investigating diseases of elementary properties and qualities, questioning the validity of every dogma, ancient or modern; studying medicine as a physical science, is seeking for the nature of diseases *in the alterations of the tissues*, is patiently collecting facts, declaring that we are not yet ready for the deduction of general principles to form a system. The disciples of this true philosophy in France, and other countries, warned anew by the ephemeral history of this commanding physiological system, of the danger of being too hastily betrayed into generalization, seem disposed to adhere with increasing faithfulness to this only rational method of investigation. And, accordingly, one of the most eminent of the French physicians, M. Rostan, author of *Organic Medicine*, classes this intermittent fever among those affections whose pathology is unknown, and calls it 'the despair of organic medicine!' Considering it hopeless ever to arrive at any certain and definite knowledge of the cause of intermittence. This last conclusion we cannot but regard as unphilosophical; it is a denial of the omnipotency of the philosophy of observation—for who shall limit its discoveries, that regards the present state of the physical sciences attained under its happy guidance?"

"We should not doubt that the accumulated observations of the present age will discover some fixed and uniform physical organic changes upon which this singular disease depends, and thus arrive at a knowledge sufficient to guide us, with a steady and satisfactory light, into correct principles of its treatment. For we anticipate that this disease will claim, in an eminent degree, the attention of the present generation; the pride of science is concerned in explicating the nature of an affection treated so empirically, yet so successfully."

Convinced of the importance of recorded facts, I have been induced to make from my note book a brief abstract of the following cases, observed from the 28th of July to the 1st of October.

A minute detail of forty cases of intermittent and remittent fever is there given. These cases were observed particularly in reference to the manifestations of *spinal tenderness*, and the treatment was directed specially in reference to this feature, viewing, as he did,

the spinal affection as intimately connected with the peculiar train of febrile phenomena characterizing these two forms of fever. To continue, in the words of the writer: "It thus appears that of these forty cases of intermitting and remitting fever, *this tenderness on pressure of some portion of the spinal column* was present in all but four cases of remitting fever, viz: Nos. 3, 15, 22, 39; and in two cases of intermittent, viz: Nos. 9 and 20; but of these, however, one was arrested by *a blister to the spine, without other means being used* but dieting; and the other was modified materially in its character in like manner." His method of examining the spinal column is here detailed, and any possible fallacies critically and impartially discussed; at the end of which discussion, we must say that even a prejudiced mind would candidly admit that in the cases reported the symptom was not a creature of *à priori* determination, but a real and prominent feature in the cases. He recommends exploration of the spinal column by *mediate percussion*, as well as by simple pressure, and affirms that the former mode is far preferable, as it can be made reliable, even over a blistered surface, for where true *spinal* tenderness does not exist, the tenderness of the skin does not in the least interfere with this method by *mediate percussion.*

"Another question naturally presents itself—what is the force and value of this symptom? whence this uneasiness? what does its existence indicate? Certainly not that the *skin* at these particular points is sore and tender; I have endeavored carefully to verify this fact, by taking it up between the thumb and finger, and compressing it with more force than was applied by the direct pressure, uniformly receiving the assurance of the patient that the uneasiness was of a different character from that produced by pressure upon the bone. But if this might be the cause of pain in the method by *pressure*, it cannot be in that by *percussion;* for it is well known to those who make use of mediate percussion that it may be employed freely, even upon a blistered surface, without producing pain. It as certainly does not indicate that the *bone itself* is tender and diseased; for we cannot conceive why pressure upon a diseased bone should be followed by sighing, coughing, increased oppression of the præcordia, nausea and faintness. It is as unsatisfactory for the same reasons to attribute this symptom directly to a diseased state of the *ligaments* of the vertebræ.

"Having thus excluded these three parts from any participation in the production of this phenomenon, we next inquire—can it

proceed from a diseased state of the dura mater lining the bony channel? We answer, unhesitatingly, that the symptoms above referred to, developed in distant organs by the examination, cannot *arise directly* from an inflammation or any degree of irritation of the dura mater, for reasons assigned already; but we can conceive very readily how the dura mater, being in a swollen state, might produce such symptoms by compressing the origin of the nerves supplying these distant organs, when an unusual degree of motion is communicated to the vertebræ by percussion. But we perceive that this unusual motion of the vertebra would produce the same degree of pressure if the dura mater were in its normal state, and the substance of the cord itself enlarged. We, therefore, must necessarily adopt the conclusion that this phenomenon indicates a diseased state, either of the medullary substance of the spinal cord, or of its investing membranes. I am not prepared to infer from these few cases that this local affection of the spine always exists, nor that it is the primary irritation upon which these fevers depend; but if subsequent observations shall establish the uniform existence of this spinal irritation at the commencement of intermitting and remitting fevers, it will confirm the opinion now almost universally held by the profession of the local origin of all fevers, and the equally universal persuasion that this location is in some part of the nervous system."

After presenting many arguments drawn from the analogy recognized between many nervous diseases, such as ordinary colic, colica pictonum, spasmodic asthma, hysteria, and intermittent neuralgia, in which diseases his observations had for years past uniformly detected *spinal irritation*, and intermittent fever, Dr. Ford concludes this portion of his subject thus: "These considerations, showing the intimate connection in particular cases between spinal irritation and diseased function of almost every tissue of the body, together with the fact of the intermittency of those diseases called nervous, are calculated, I say, to raise the presumption, *that the phenomena of these intermitting and remitting fevers depend upon a local or general diseased condition of the spinal marrow.*"

The other writer, whose name we have referred to, is Mons. F. C. Maillot, who during the same year, 1836, published a treatise with the following striking title page: *Traité des Fièvres ou Irritations Cerebro-spinales, Intermittentes d'apres des observations recueillies en France, en Corse et en Afrique.* J. B. Baillière, Paris, 1836. In this work M. Maillot enters more deeply into the subject of the

spinal affection in its relations to paroxysmal fever, and many of his conclusions are based on autopsic observations in which he reports many features of structural change in the cerebral and spinal centres, thus adding the more positive testimony of the pathologic condition of the parts to the rational and theoretic evidence advanced by Dr. Ford.

As M. Maillot's views are contained in a permanent, accessible volume, we make but a single quotation from him, but these few lines fully expound his doctrine, and show very plainly the cerebro-spinal element in all paroxysmal fevers: "Howsoever divided the forms of this fever may be, there will uniformly be found those symptoms, though sometimes obscure, indicating this morbid state of the cerebro-spinal centre, as the pathological basis of the disease, just as, however complicated any organ may be, whether it be the brain, the liver, the kidney, a muscle or a bone, in each alike, there is the cellular tissue as the fundamental element, necessary, indispensable, without which the organ could have no existence—no foundation for its superstructure."[1]

The acceptance which these doctrines have received as well as the success of the principles when applied to practice, are well exemplified in the following brief extract of a letter from a former pupil, to our brother Dr. Robert Campbell:—

COOSA VALLEY, ALA., May 19th, 1858.

DEAR SIR: We have a great deal of intermittent fever in Alabama, and I am trying the combined powers of *revulsives to the spine* and the shower-bath, with complete success, in every case. The most rebellious cases yield to it *like a charm.*

The cure is, in most cases, permanent; when there is a relapse, I feel confident of *spinal tenderness*, and order revulsives with an occasional shower-bath, until recovery is complete. I often even do not use a laxative.

Yours truly,
W. C. NEAL.

TO ROBERT CAMPBELL, M. D., Augusta, GA.

Thus indoctrinated in the correct pathology, treatment ever becomes to us both simplified and efficient.

Notwithstanding that, such is the firm conviction on the part of some, with regard to the cerebro-spinal nature of the pathology of

[1] Op. citat., p. 17.

paroxysmal fever, in spite of the difficulties attaching to the organic changes, still there is no subject in which at the present time, medical opinion is more fluctuating and unstable than in regard to these diseases. To show how different are the views held by even some of the most distinguished writers of the present day, as well as to illustrate the peculiar difficulties attaching to this important part of our subject, we quote the following from that excellent practical work, *Copeland's Dictionary*, and by this quotation we can at once perceive that the author abandons the cerebro-spinal theory, mainly because he finds it impossible to conciliate the contradictory facts presented in the organic changes, on sufficient grounds by any acknowledged principle of physiological action. We here candidly present his arguments against the cerebro-spinal doctrine in the confident hope that, the *direct* influence of the cerebro-spinal centres over the ganglionic system (although it does not by any means constitute excito-secretory action);[1] having gained stability, by the establishment of this more recent doctrine, will be now admitted as exerting a decided influence in the organic phenomena of febrile diseases, thus removing the inconsistencies heretofore embarrassing this doctrine. This direct influence, as will be seen below, has been sometimes discussed, but most frequently *strongly denied.*

After reviewing certain arguments in favor of the theory that the cerebro-spinal is that portion of the nervous system primarily affected in malarial fever, this author abandons the idea as untenable, and presents the following objections, which, to his mind, appear insurmountable, on account of the physiological difficulties presenting themselves in its adoption.

"The doctrine that the causes of fever first affect the cerebro-spinal nervous system is invalidated by the following considerations: This system either does not send nerves or it supplies but few nerves, and those often indirectly to the organs especially and essentially affected in idiopathic fevers, as the heart, bloodvessels, secreting viscera, lungs, &c. The generation of fever within the body itself cannot be explained upon the supposition that the cerebro-spinal system is primarily and solely affected, or even chiefly concerned in the production of the disease; but may be readily solved by means of the nervous system of organic life, if we take into consideration its functions and structural relations, especially with the vascular system, the circulating fluids and the excreting

[1] Excito-secretory action contemplates an incident nerve, as an excitor.

viscera. The early lesions whether of function or organization, characterizing the first as well as the advanced period of fever cannot be accounted for by assigning the cerebro-spinal system as the primary seat of the disease; for, 1st, as this system *cannot*[1] *influence the heart, and the state of the vessels, excepting through the medium of the organic nervous system, and this only to a very limited extent, changes in it, do not explain the alterations of the vascular system, and still less the vitiation of the blood.* 2d. *As it does not control animal heat, so it cannot induce those remarkable extremes and morbid states of temperature distinguishing the malady.* 3d. *As it does not supply nor materially influence secreting surfaces and glands, so it cannot give rise to those early changes of function* which they present, nor to those *lesions of structure* which they often subsequently experience. 4thly. As it does *not materially affect the actions of assimilation and nutrition, so it cannot occasion the remarkable changes they present in fevers,*" &c. &c. He finally concludes by expressing the following opinion: "Anatomical and physiological evidence concur in showing that the nervous system of *organic life* is chiefly concerned in the production of these functions, and therefore it may be inferred that *this* system is first impressed by the causes of fever."

This opinion, based as it is on an imperfect knowledge of the action of the nervous system, and embodied in a work which has justly obtained general currency, and which commands the confidence of the whole scientific world, will not bear examination in the light of the advances which Physiology has made during the last seven or eight years: for now, not only is the *direct* action of the spinal centres, through the ganglionic system, upon the organs admitted, but that more recondite process (the study of which has *established* the other), viz., *reflex excito-secretory action*, has been fully recognized and demonstrated, leaving the objections of our author entirely invalid and unsubstantial.

By the admission of nearly every author since the days of Boerhaave and Cullen, and still more by the evidence of the facts carefully presented in the foregoing parts of this paper, it will be seen that the phenomena of paroxysmal fevers pre-eminently indicate that the cerebro-spinal system is largely if not primarily involved. 1stly. We have seen that both *sensation* and *motion*, the two prominent endowments of this system, are unmistakably aberrated; intermittent fever and neuralgia having been shown in our case 3d,

[1] The Italics are ours.

p. 587, to be not only strongly analogous in their phenomena, but mutually *convertible*, while in the cases of "Paroxysmal Convulsions," page 593, the motory phenomena of the one *are but the same, exaggerated* in the other. 2dly. These aberrations in the sensory and motory phenomena of the cerebro-spinal system always occur in accordance with that invariable law of *periodicity* imposed upon this portion of the nervous system. 3dly. We have seen that, according to the careful observations of a variety of authors, as Teale and others, *spinal tenderness* is almost invariable in neuralgic affections, and that this spinal tenderness has its locality in accordance with the particular nerve or set of nerves affected by the disease; while on the other hand, in the careful investigations made by Professor Ford, with the definite view to settle this point, we find that this same spinal tenderness is recognized in 36 out of 40 cases of paroxysmal fever, and that the treatment, when applied in special reference to this fundamental feature of the affection, very much modified the entire phenomena, and the disease promptly yielded. And again, that Dr. Maillot is so firmly impressed with the cerebro-spinal nature of these phenomena, that he terms these fevers "cerebro-spinal intermittent irritations."

Since, then, paroxysmal fevers, by the weight of such abundant authority, has its primary location in the cerebro-spinal centres, how shall we explain those phenomena of this disease which relate to organs known to be *outside* of the domain of this portion of the nervous system? The question has finally, then, definitely assumed the simple form, in which it has occasionally presented itself to the minds of several writers, but which, as we have said, could not be satisfactorily answered, on account of the deficiency of physiological data: viz., Can irritation, or other changed condition, in a spinal nerve or cerebro-spinal centre, give rise to such modifications in the innervation of the organs as to change their secretions, alter their circulation and nutrition, eventually producing the condition of the tissues as congestion, inflammation, modified temperature, &c., presented by the *organic changes* of paroxysmal fever.

To argue this question fully, we consider unnecessary in this place, as it would be but reviewing a large portion of the ground upon which the *excito-secretory* action of the nervous system is established; for although, as we have before said, the *direct* influence of the cerebro-spinal centres upon the ganglionic system is not *true excito-secretory* action, still *that function comprehends this, as a portion of it.* We will therefore refer but cursorily to a few facts of this

system, while we will adduce others which strikingly demonstrate, in the analogous results of experiment, the entire competency of the spinal centres to produce all the changes under consideration.

We have shown on former occasions[1] that a peripheral irritation in the sensory branches of the fifth pair occasioned by the presence of the growing teeth, is capable of exciting not only convulsive movements in the voluntary muscles, but that this same irritation is capable of provoking the *secretions* of the intestinal mucous membrane, kidneys, and other abdominal viscera, by being propagated in an analogous manner through, first, the spinal, then the ganglionic centres, and finally through the secretory nerves supplying these organs. On these occasions it was shown that by this same reflex action, not only the secretions were increased and altered, but that the circulation can be so modified as to produce actual alteration of tissue. In this manner we accounted for the congestions, inflammations, and even ulcerations in the mucous membrane of the intestines, and also for the eruptions of every variety, as well as for the dropsical effusions and other phenomena of aberrated nutrition, so commonly observed in cases of this kind. So fully impressed were we with the *necessity* of our results, that we predicted, with much confidence, that this peripheral dental irritation was not only competent to increase the quantity of the urine by a temporary diabetes, but that when such urine of teething children should be examined, *sugar would be found* as one of its constituents. The opportunity having been subsequently afforded and the analysis made, the sugar was actually found by (as we are informed) Dr. W. A. Hammond, of the United States Army.[2] By this verification, the whole doctrine of the excito-secretory action of the nervous system was greatly corroborated. But since our promulgation of these views, M. Claude Bernard and others have given ample demonstration of their truth by experimental facts, most of which refer to the *direct* influence of the spinal centres upon the organs, while one[3] or two illustrate *reflex* excito-secretory action.

Some of the above facts we have referred to in the earlier parts

[1] Essay on the Influence of Dentition in producing Disease, 1850. The Sympathetic Nerve in Reflex Phenomena: *Trans. Amer. Medical Association*, vol. vi., New York, 1853. Letter to Dr. Marshall Hall on Excito-secretory System of Nerves: *London Lancet*, May 2, 1857.

[2] See North American Medico-Chirurgical Review.

[3] Galvanizing the Pneumogastric Nerve to Excite the Glycogenic Function of the Liver.

of this paper; as, for instance, the production of "artificial diabetes," by Dr. Bernard, in which experiment he pricks a certain part of the medulla oblongata,[1] in rabbits and other animals, and accordingly as the experiment is varied, sugar, or other matters appear in the urine. These results serve to illustrate very conclusively that, an irritation in a spinal centre is capable of exciting and modifying the secretions in distant viscera; but still more significant, and fully as applicable to our subject, are the results of certain physiological experiments made by Dr. Brown-Séquard, and which we find detailed by him in a work entitled *Physiological and Pathological Researches.* These will be found related in full on page 566 of the present paper. In these experiments, it will be seen that an injury produced in the spinal cord gave rise to enlargement of the supra-renal capsules, increasing these organs by engorgement, to two or three times their natural dimensions. These are very valuable facts, supplied by M. Brown-Séquard, and though he does not appear fully to appreciate their real significance himself, for he says "the congestion is the result of a *peculiar disturbance in the nervous action;*" any one can *now* recognize them, as being closely allied to the phenomena of that excito-secretory action, which M. Brown-Séquard has stated,[2] was to be found "in some very old books."[3] We shall, however, not *wonder* at them, but after giving them that "touch of sound theory" *which alone can make them valuable*, we shall endeavor to *apply* them in clearing some of the most embarrassing obscurities in this difficult department of pathology. When they come to be applied in our consideration of the structural changes in the special organs, as the liver, spleen, &c., they will be found to demonstrate a most important principle, viz., *that the circulation in parenchymatous structures can be modified by influences which do not bear directly upon, either the secretory ganglia themselves, or upon their branches of distribution*, but upon the centres of the *cerebro-spinal system.*

We cannot pass on to the consideration of cases, without some reference in this place, to that prominent characteristic of fever, presented in the aberrations of animal temperature. For the fact that animal heat is a phenomenon intimately connected with the

[1] Floor of the fourth ventricle near origin of fifth nerve.

[2] New York Journal of Medicine.

[3] It is certainly very strange, then, that M. Brown-Séquard should refer to it as a "*singular* influence possessed by the spinal cord." (*Vide* op. citat., p. 13.)

action of the nervous system, science is perhaps more indebted to the investigations and experiments of Sir Benjamin Brodie, than to any other physiologist; for, it was by his observations as early as the year 1811,[1] that the ultra chemical theories of Lavoisier and Laplace were shown to be insufficient alone, to account for the phenomena. His observations led him to attribute animal temperature to the *cerebro-spinal* centres, while the subsequent researches of Dr. Claude Bernard[2] have located the function in the *ganglionic* system, thus apparently disproving the satisfactory results obtained by Sir Benjamin Brodie. The subject of animal temperature will be considered more fully hereafter, in its relations to *fever-heat*, when it will be shown that the apparently contradictory results of these two distinguished physiologists can be made to harmonize upon those principles which have only become prominent since the announcement of the *excito-secretory* system. In the *ganglionic* system, the control of animal temperature does, probably, primarily reside, as proved by M. Bernard, but that it is exalted or depressed by changes in the *cerebro-spinal* centres, as on the other hand proved by Sir Benjamin Brodie, we can *now* see is not only undeniable, but also thoroughly explicable by, and consistent with, an acknowledged principle of physiology—"Truth misapprehended is, for all that, neither altered nor destroyed."

THE CONSIDERATION OF CERTAIN PHENOMENA ALLIED TO, AND ILLUSTRATIVE OF THE PATHOLOGY OF CEREBRO-SPINAL FEVERS.

We have heretofore endeavored carefully to present a number of facts, sufficient to call attention to the reflex relations existing between the cerebro-spinal and ganglionic systems. We now adduce others, which, from their peculiarities and affinities, make a somewhat nearer, but rather a gradual approach to the essential phenomena of paroxysmal fevers.

It will not perhaps be considered irrelevant to our subject, here

[1] *Vide* Philosophical Transactions, 1811–1812. Croonian Lecture on some Physiological Researches respecting the Influence of the Brain on the action of the Heart, and on the Generation of Animal Heat. Also, Physiological Researches, by Sir Benjamin C. Brodie, Bart., D. C., and F. R. S., member of the Institute of France, &c. &c. Collected and republished.

[2] Leçons sur la Physiologie et la Pathologie du Système nerveux, Paris, 1858. Leçon 16, vol. ii. p. 512.

to record certain observations of our own, made upon the phenomena attending the formation and progress of abscesses in different tissues of the body. Abscess of the liver is not a very uncommon affection in warm climates. It is uniformly observed to make itself known by a dull, obscure, persistent pain in the region of that organ, which pain is often so obscure as not to arrest the attention of the patient, till considerable involvement of the hepatic tissue has taken place, unless the inflammation has progressed to the peritoneal covering, when the pain becomes very acute. The same may be said of abscesses of the lung, and also of abscesses in the parenchyma of all those organs, as the kidney, &c., which are not at all, or but meagrely supplied with cerebro-spinal nerves. These are facts which are familiar to every one; but in abscesses which are far more common, the phenomena, it appears to us, have not been so critically observed. Let us take, for instance, as a familiar example, the phenomena accompanying ordinary whitlow, or external abscesses anywhere. As observed by us, the actual inflammation is always preceded, for several days, by pain and redness in the part about to become the seat of the abscess. This *pain* and *redness, too, are invariably intermittent*, recurring every evening, or morning, as the case may be, subsiding for an interval, generally, though not always, during the night. On the abatement of the pain, the redness, as we have said, almost entirely disappears; but on the frequent repetition of the paroxysms, the inflammation becomes fully established, suppuration begins and progresses; but, notwithstanding this, from the first inception, to the complete subsidence of this furuncular inflammation, that same marked feature of paroxysmal exacerbation *of a definite type*—sometimes quotidian, sometimes tertian (for we have critically noted both), continues to present itself with the most uniform promptness of recurrence.

While we have thus dwelt upon these phenomena of abscesses, we do not wish to be misapprehended as characterizing them, on account of these cerebro-spinal phenomena, as strictly cerebro-spinal in their origin in all cases. That they owe their origin often to irritation here primarily located, there can be no doubt. The formation of an abscess is undoubtedly, essentially an aberration of nutrition, or of the circulation. If they form in organs not well supplied with cerebro-spinal nerves, as the liver, lung, or kidney, no pain, or but little, is produced; but, on the other hand, if this aberration in the circulation occurs in tissues well supplied with cerebro-spinal nerves, we must have pain, which is one of the expres-

sions, or complaints, of the cerebro-spinal system; but how is the pain expressed? not continuously, but in the only manner in which the cerebro-spinal system can express anything, viz., by *paroxysms, intermittingly*, for this pain is a manifestation, as we have seen, of that system "whose healthy life," as Henle says, "is periodical." This, then, is the explanation of the periodical feature of these abscesses. But a simple periodical manifestation of pain is not the most important relation which the cerebro-spinal element bears to these abscesses; the periodical excitement appears to modify, and, indeed, to control the manner of the formation of the abscess, by a true excito-secretory process, that is, during the paroxysmal excitement in the cerebro-spinal nerves, the secretory filaments of the ganglionic system are excited to the aberrent action under which the pus is deposited, and according to our most diligent observation we are inclined to the opinion that, in these cases, this pus is *only deposited paroxysmally during the existence of the periodical pain.*

We are aware that the intermissions of pain and excitement may be referred by some to the relaxation of the tension of the sac, thus removing the "*pressure from the nerves;*" but this opinion will not bear examination, for unless some other influence underlies this phenomenon, why should this relaxation occur *periodically?* The secretion of yesterday, with all its pressure, is there to-day, and yet the pain is gone. The pain cannot, then, be due to pressure; but to some other and, perhaps, not yet fully comprehended principle of the nervous system. Whatever this principle may be, we plainly perceive that it manifests itself periodically, and that these periods are distinct. Quinine, we have found, often prevents these paroxysms, and, when administered early enough, will abort or prevent the formation of the abscess.

These general remarks may, perhaps, be more fully appreciated as illustrated in the following case, supplied to us by our brother, Dr. Robert Campbell:—

CASE 9.—The patient, aged about 30 years, became the subject of "boils," in the month of February, 1858. This furuncular inflammation appeared on the back and the abscesses, not more than three or four at a time, were located upon the dorsal and lumbar regions. These abscesses were of the most painful character, and interfered much with the exercise of any active business on the part of the patient. This inconvenience, however, *was not continuous;* in the repeated attacks or eruptions which this patient sustained, each one

of them was as plainly *characterized by intermissions* in the pain and other phenomena of the furuncle, as the most decided paroxysmal fever could possibly present; and these intermissions were of the tertian type, presenting themselves in the most marked manner from the earliest period at which the inflammation began to manifest itself to the time of the full maturation of the abscesses. This is not all; a close observation of this prolonged and very painful case developed that, the *hebdomadal* period was as accurately observed in the relapses, as the tertian type was marked in the exacerbations of pain, phlogosis, &c., of each attack. The tertian type was so well marked that Dr. Robert Campbell was induced to treat the case with *quinine*, given on the day of the expected paroxysm. This was generally at 12 o'clock M. Twenty grains of quinine were administered during the morning. The effect of the quinine was, to prevent entirely the accession of the pain, and so greatly diminished was the tenderness, that the patient wore his coat with comfort, and continued to attend to an active business, without inconvenience, during the subsequent progress of this attack. This decided effect of quinine was observed, not only in one of the attacks, but in several of them which occurred during four or five months that the patient was subsequently the subject of the relapses of the disease. Another effect of the quinine, observed in this case, was that while it relieved the pain, it did not prevent the maturation of any abscess which had fully begun to form; but the progress of suppuration was evidently *retarded*, it taking those abscesses in which quinine had been given longer "to come to a head" than when the quinine was omitted. The above interesting facts having been detailed to us by Dr. R. Campbell, we requested the opportunity to examine the case particularly with him, and accordingly at the next hebdomadal relapse this opportunity was afforded us. At the time of this examination the affection had assumed, in a certain degree, the quotidian type; the pain was of daily occurrence, and at about the same hour as before; but on *alternate* days the pain and inflammation were such as to confine the patient to the house, while they were much slighter in the days intervening. There was, during the intense suffering of the paroxysm, some excitement of the pulse and increased heat of surface; but the ordinary general phenomena of fever were at no time present in any of the attacks. The present examination was made about the time of the third graver paroxysm, the patient having neglected to resort to quinine on account of its bitterness, and from

its not affording permanent relief from the liability to the relapses. On removing the clothing we observed four boils, all in very nearly the same stage of progress. They were situated on the left side below the scapula, and occupied a location between the fifth and eighth ribs, near the centre of the shafts of these bones, and at distances ranging consequently from four to six inches from the spinous processes of the vertebræ. Each furuncle was surrounded by an areola of an intensely red and inflamed character, about an inch and a half in diameter. These areolæ were very tender to the touch, and the elevated centre of the boil, acutely so. The surrounding skin, which was apparently healthy, and of normal color, presented no tenderness in any part; even when the parts between the boils and the spinal ridge were pressed upon, there was no tenderness felt[1] or manifested. Turning our attention now to the *spinous* processes, we found no tenderness manifested on pressure till we arrived, examining from above downwards, at the upper dorsal vertebra. This was exquisitely sensitive to pressure; but in none above or below that point was there any remarkable tenderness till we arrived at the last dorsal, which was slightly tender on pressure.

Having frequently observed the pain of costal neuralgia immediately relieved by the application of revulsives to the corresponding portion of the spinal columns, and wishing also to test our opinion that this tenderness in the spinous process had an etiological relation to the phenomena of the abscess under examination, we applied a plaster, composed of equal parts of Indian meal and mustard, to the back of the neck, so as to cover the affected vertebra. In less than one hour the pain had entirely subsided, together with the exquisite tenderness of the affected parts, and the patient was able to wear his coat with comparative comfort.

Having witnessed such decided relief from the application of the sinapism, it was determined to apply some revulsive which would be more permanent in its effects. This was, however, neglected until the occurrence of the second attack, subsequent to the application of the mustard plaster. On the occurrence of the attack, the patient objecting to the application of a blister, on account of his having observed that blisters were followed by furuncle, the spine

[1] There can be no doubt as to the care with which the phenomena have been noted in the above case, as it occurred in the person of a physician who is himself an intelligent and careful observer.

was subjected during the height of the paroxysm, to a most thorough dry-cupping over the region manifesting tenderness. The relief from pain, &c., was immediate. This "crop of boils" went on to maturation with but little inconvenience to the patient, as when quinine had been taken and when the mustard had been applied, and since that time, there has been not the slightest indication of a relapse, nor the least tenderness of the spine. The relief appears to be permanent.

We are not aware that the observation has been recorded elsewhere, that the phenomena succeeding surgical and other wounds are of a decidedly paroxysmal character. This feature we have so frequently, we may say so invariably observed, that its existence in such cases appears to us to be the rule. We are all familiar with the common expression "fever in the wound" or "fever in the stump," but few, we apprehend, have observed that this fever observes an intermittent course.

CASE 10.—J. C., a young man aged 22 years, was injured in the hand with a circular saw in such a manner as to necessitate the amputation of the ring finger. The wound was dressed on the third day, and presented a most promising aspect; the edges of the flaps were closely adherent and union had fully begun. On inquiring we learned from him, that every other night he suffered pain, and asked if he might be allowed to loosen the bandage, for his hand became swollen, and all the wounds upon it appeared to be aggravated by the tightness of the bandages. His hand had been so painful the night before, that he had anticipated the day for dressing and called to-day, though it was now easy. On the second night after the dressing we were sent for, and found the patient complaining much of the painful and throbbing condition of his hand; we found it much swollen, and on removing the bandages and adhesive straps, the edges of the flaps had separated and were somewhat everted; the end of the stump was also suppurating profusely, while the other wounds about the hand all presented an inflamed and swollen appearance.

Having carefully dressed the wound, the patient was quieted by morphine and rested in comparative comfort, especially during the first part of the night. Feeling confident of the periodical character of the pain, and suspecting that the other unpleasant symptoms were intimately connected with it, we prescribed quinine thus: on the day succeeding our present visit, xv grs. in four powders to be

taken, one powder every two hours till all were taken; on the day after, xx grs. in four powders, to be given in the same manner. Our object in the first administration of quinine was to guard against the possibility of an *intercurrent* paroxysm in anticipation of the tertian type, which the case had heretofore presented.

The result answered our most sanguine expectations; the patient did not suffer a return of the paroxysm and the wound from this time healed kindly and gave nothing more than the ordinary trouble of such cases.

We are aware that it may be said, that the above swelling and pain are due to the formation of the abscess in the stump, and that the wound healed kindly after the discharge of the pus collected in the end of the stump, independently of the administration of the quinine. We feel that we can very well afford to suggest this objection—indeed it was one which occurred to our mind at the time, but our subsequent critical observation of a large number of similar cases, has fully convinced us that the above objection has no real force in setting aside the principle we wish to illustrate by the case; for we have found that, *whatever amount of pain there may be succeeding such wounds, it is always paroxysmal.* If the paroxysms of pain are *frequent, prolonged, or very acute*, we have also found that it will be *followed by suppurations and an interruption to the healing process*, and therefore we give quinine when such is the nature of the pain, and our experience is that the pain is, as a general rule, much lessened, or prevented, and that the suppuration is either prevented or retarded.

The objection which we have raised, moreover, cannot explain away the fact that the pain is intermittent, and much less, that the swelling and increased phlogosis are also intermittent. "*Ubi irritatio, ibi fluxus*," is a dogma which fully satisfied the medical mind even for a long time after it had ceased to satisfy the requirements of the problem presented by the phenomena of an inflamed and suppurating wound. When this dogma failed, that most plausible term, "sympathy," a very *fuga vacui* in medical science, was invoked, and this has finally been abandoned by the demand for a more definite explanation. The true account of these phenomena, as we think, has been already suggested by us when discussing the subject of suppuration in reference to its periodicity, viz: That when a part of the surface is wounded either by incision, puncture, or the persisting presence of a foreign body, as a splinter, a number of the sensory filaments of the cerebro-spinal system is neces-

sarily wounded; these filaments thus impressed, communicate the excitement to the spinal centre, thence it is reflected to the secretory ganglia and filaments directly controlling the vessels of the part, these are aberrated in their action, and the modified circulation, and the secretion of pus are the results of this reflex aberration in the two nervous systems. The phenomena of suppuration, then, under the above circumstances, may be fairly considered as true excito-secretory phenomena. That the cerebro-spinal irritation appears to be an important element in the various processes of inflammation, the experiment of Magendie, we think, will fully establish. On the application of an irritant to the sound eye of an animal, pain and redness resulted when the branches of the fifth pair were cut, and as we have shown, the ganglionic filaments paralyzed along with it; no action could be aroused in the part even by the application of the strongest irritants, as aqua ammoniæ, etc. etc.

M. Brown-Séquard has shown by certain experiments on cuts,[1] that the healing and reparative processes in wounds and ulcers go on vigorously in parts when the cerebro-spinal innervation is paralyzed; he says nothing with regard to the suppurative process. We have reason to believe from the following case that suppuration is arrested in parts when all the sensory cerebro-spinal filaments have been divided, while the healing process is not by that means interfered with.

CASE 11.—Mr. J. applied to us with an osteo-sarcoma of the inferior maxilla of the left side. The tumor involved about two inches of the body of the bone, together with the sublingual gland of that side and under surface of the tongue. Suppuration was very profuse and of course offensive. He had suffered very acute pain for several months, which was always more severe at night, depriving him of his rest. An incision was made along the base of the ramus of the lower jaw nearly to the symphysis, and another was made, beginning below the free border of the lip on the central line down to the first. The cheek was then dissected from the body of the jaw-bone and the saw applied, first above the angle of the bone and then at the symphysis. Thus all the attachments of the bone being removed, the dental branch of the inferior maxillary was severed, and a large portion of it removed with the body of the bone. After cutting the nerve near its entrance into the canal, the

[1] Op. citat., p. 15.

patient experienced no pain from the operation; a large surface was left open by the operation, but *there was scarcely any suppuration whatever*, the discharge consisting entirely, so far as we could observe, of saliva. The healing process between the lips of the wound progressed very rapidly, and the patient was able to return home to a distant part of the State, after the second dressing on the fifth day. He died one year after, from a return of the disease.

In the above case the entire absence of pain after the operation was plainly attributable to the section of that portion of the fifth nerve which supplied all the parts interested; and may we not, on the principles we have endeavored to establish, infer that the arrest of suppuration from the large surface exposed, was due to the same cause?

CASE 12.—The patient, H. M., a woman aged about 50 years, applies to us for treatment in an affection of the left eye, which, on examination, we find to be conjunctivitis. The ball of the eye is very red, the vessels are much injected, and the congestion has extended to the cornea, which is cloudy, with slight general opacity. On inquiry, we find that this affection began with a pain in the eye, which "came on every other day." There was at first, no redness of the ball, but there was a profuse secretion of tears, during the whole evening of each day on which she suffered from the pain. We further found that at the second or third paroxysm the inflammation commenced, with heat on the surface of the temple and redness of the eye, which was found to subside with the subsidence of the paroxysm of pain. After many paroxysms of this kind, the redness became, to a certain extent permanent, but was increased with the return of each paroxysm, till finally the eye had assumed the condition, threatening blindness, presented at our examination.

Here we have presented a case which in the first place, was one of simple intermittent neuralgia, of the tertian type, affecting certain branches of the fifth pair distributed to the eye and temporal region. As the neuralgia continued to recur every other day, the irritation located in the cerebro-spinal sensitive nerves rendered them *excitors* to the branches of the ganglionic system controlling the bloodvessels of the conjunctiva, till finally these repeated aggressions made upon the nerves of these vessels, so aberrated their action as to establish a permanent congestion, which, as we have seen, threatened the destruction of vision. At the time of our

seeing the case, the instigating cause (the neuralgia) of the present condition of the tissues had by no means ceased, for on every second day, although the pain now was not very acute, there was plainly observable a decided increase in the amount of inflammation and heat in the part affected. The primary neuralgia was enveloped and obscured in the more alarming inflammatory concomitants of the case, but the cerebro-spinal element could still plainly be recognized (taking the history of the case into consideration), by the unmistakable feature of periodicity, as the true basis of the complex phenomena now presented.

CASE 13.—J. R., a young man, aged 24 years, had been the subject of chronic gonorrhœa for several months. When called to see him at 4 o'clock P. M., we found him suffering acutely from orchitis. The testicle was much enlarged, the scrotum swollen and red, and there was much tenderness along the direction of the spermatic cord. Prescribed morphine gr. ¼, and lead lotion with a suspensory bandage. The morphine relieved the pain for a short time, but it soon returned and continued to increase till midnight, when it began to decline. Next morning at 10 o'clock we found him entirely free from pain; *the redness had disappeared*, and the *swelling had much abated*. Called again to our patient at 4 o'clock P. M. Find him suffering fully as much as on preceding day. He informs us that he was comfortable until 2 o'clock, when the pain began along the cord, and that on its increase, the redness and heat also advanced until the scrotum finally came to present the burning and the turgescent appearance now seen by us. Now there was slight general fever, the pulse being 96 per minute. Prescribed morphine as before, and a saline laxative to be given next morning. The symptoms had all disappeared on our visit to the patient on the succeeding day.

In the evening of this day we were called to the patient, and found him suffering more acutely than at any previous visit. The organ was exquisitely sensitive to the touch, red, hot and swollen, while there was also great tenderness along the cord. On examination of the spine in the lumbar region, we found great tenderness of the second, third, and fourth lumbar vertebræ. Morphine ¼ gr. was administered, and a mustard plaster applied over this region, which was also treated by the free application of dry cups. For the next day, we prescribed the following: quinine 5 grains, to be taken every two hours, beginning at 8 o'clock in the morning; con-

tinue till twenty grains have been taken. The fever, together with the inflammatory phenomena, having subsided before the quinine was commenced, they did not return, and the patient rapidly recovered, though the testicle was somewhat enlarged and heavy, but not painful, at the time of the discharge of the patient.

A case very similar to the above, will be found reported by Dr. William H. Doughty, of Augusta, in the September number of the *Southern Medical and Surgical Journal*, for the year 1858. In relation to his case, Dr. Doughty makes the following truthful remark: "The exceeding great rarity of these cases entitles them to peculiar interest, if for no other reason, than the opportunity which they present *of beholding an organ under the congestive influence of an intermittent.*"[1]

Many facts to be observed in the obstetric department of medicine, can be made to illustrate very clearly the influence exerted by the cerebro-spinal nervous centres over the pelvic viscera in both excito-motory and excito-secretory action. Dr. Tyler Smith has demonstrated the first so fully that little can be added to his observations on the subject, except so far as it relates to the connection which this reflex action bears to malarial fever. On this point we have constantly observed that miscarriages are frequently produced by a spinal irritation, which for days, preceding this catastrophe, if closely watched, would be found to manifest itself *in paroxysms* of either a quotidian or a tertian type, and which, if timely treated by revulsives to the tender region of the spine, and proper doses of quinine, would be arrested, and the premature delivery might thus often be prevented. These paroxysmal manifestations, *without any general fever*, often show a strong disposition to assume the hebdomadal relapse character, and the evil which is averted *now* may be consummated in fourteen or twenty-one days, from the attendant's inadvertently failing to anticipate the relapse period, with the application of the proper simple remedies. On this subject, our notes would furnish us with many cases, but as excito-*motory* phenomena have not any direct relation to this portion of our subject, we cannot afford space for them in this place. Among phenomena illustrating excito-*secretory* influences in these parts, we report the following single case.

CASE 14.—Mrs. W. P., aged 26 years, has a premature labor on the 4th of August. On the 5th we find her comfortable—sent for

[1] The Italics are ours.

on the afternoon of the 6th; find the patient with considerable fever, complaining of acute pain in the hypogastric region—there is much tenderness everywhere below the umbilicus—indeed many indications of what some would consider approaching peritonitis. The *lochia*, which were profuse the day before, were *entirely arrested* now, and the parts were hot and dry when examined. The *spine* was found *exquisitely tender* in the lumbar region. Prescribed ¼th gr. of sulphate of morphine and the application of sinapism to the lumbar region. Also directed 15 grs. sulphate of quinine to be given in four doses, each two hours apart, on the next day, and the same quantity on the day following.

7th. Find the patient free from fever, tenderness in abdomen almost entirely subsided; lochial discharges not abundant, but the parts are quite moist, of a natural temperature, and no pain is experienced by the patient in the examination. Taking quinine as directed.

8th. Patient much better, no fever, abdominal tenderness has disappeared, discharges abundant. Taking quinine according to prescription.

The case progressed after the subsidence of the above symptoms so happily that we did not visit the patient until the 22d, when her husband called us in haste to see her, stating that she had been suffering acutely since 12 o'clock M., from fever with a return of the pain in the abdomen. We found her lying on the back unable to turn over in bed; the tenderness in hypogastric region more marked, even than in the previous attack. All the symptoms were nearly the counterpart of those presented, just a fortnight previously. The day following was marked by a decided remission of fever, and an abatement of pain and tenderness. Quinine being given as before, the symptoms again disappeared.

The above case is reported, not because it is unusual (though we do not recollect any record of such), but simply to show that symptoms nearly resembling inflammation with arrest of secretions and altered temperature in those parts, may be determined by an irritation located in the spinal centres, connected with and controlling the sympathetic fibres, more directly governing their circulation, secretions and temperature.

Somewhat allied to the above paroxysmal manifestations in the pelvic viscera are those peculiar forms of intermittent fever which are termed "*urethral intermittents.*" For a long time it has been noticed by various authors that in patients laboring under stricture

the introduction of the catheter or bougie seemed to give rise to paroxysms of fever, which, if not treated antiperiodically, would continue to the great detriment of the case. Our notes would furnish a great number of these cases occurring under a considerable variety of circumstances, thus, paroxysmal fever in cases of irritation from calculus, in cases of irritation from enlarged prostate, and from the irritation of stricture in every portion of the canal; but we do not deem it necessary to enter into the particulars of the cases. Suffice it to say, that the testimony of so large a number has established that paroxysmal fever does arise from the above causes, that the fact is no longer a subject of *question*, while the manner of their production has been for some time a matter of *speculation*. Dr. Joseph Jones[1] reports a case in which, like all the others, the introduction of the instruments invariably gave rise to a return of the paroxysm.

We find in the *Moniteur des Hôpitaux* the report of a case of M. Chassaignac, which appears somewhat to restrict the region of the urethra in which resides, as he terms it, the physiologico-pathological process which gives rise to the paroxysm in these cases. The following condensed statement is from the *New Orleans Medical News*:—

"Urethral intermittent fever is the name M. de Chassaignac attaches to the febrile attack which all surgeons have observed as a consequence of catheterism, and which, if it were desired to indicate the cause giving rise to it, might be termed cathartic fever. It is a curious point to determine, whether the contact of the instrument with the entire length of the urethra is necessary for the production of the paroxysmal attacks, or whether it is sufficient for one portion of the canal to have undergone such contact, and in that case, which portion. Judging from the facts known to him before the case which gave rise to these observations came under his notice, M. Chassaignac was disposed to believe that neither the membranous nor the prostatic portion of the urethra was in the portion in question. Thus he never met with an instance of such febrile paroxysm being produced after catheterism in the female, nor is he aware of any one who has ever met with one. A natural inference would be that it is not observed in woman, because the paroxysm arises from the contact of the instrument with a portion of the urethra which does not exist in her. An opportunity offered

[1] Observations on Malarial Fever, Southern Med. and Surg. Journ., Sept. 1858.

itself for confirming this conjecture, by the counter proof of the induction of the paroxysm by the exclusive catheterism of the portion of the urethra which is proper to man. This occurred in the case of a patient suffering from multiple urinary fistulæ. The catheter being passed from one of these to the meatus, and back again from the meatus to the fistula, no difficulty or pain occurring, an intense intermittent paroxysm was produced. The patient had had the catheter passed before, and had borne one fixed in the urethra without such effects having been produced. It was quite certain that on this occasion the instrument had not come in contact with either the membranous or prostatic portion of the urethra, or the neck of the bladder; and until further information upon the subject, M. Chassaignac feels justified in localizing in the bulbous or anterior portion of the urethra the physiologico-pathological process which gives rise to the production of the paroxysm in these cases."

The above cases are of much interest as illustrating the fact that, a *peripheral irritation located in the urethra* is capable of being reflected through the cerebro-spinal centres, and thence to the ganglionic system, thus giving rise to all the phenomena of paroxysmal fever. This is undoubtedly their explanation, and a comparison of these cases with the cases of traumatic fever, abscesses, &c., heretofore reported in this paper, will clear much of the mystery heretofore surrounding them.

Two kinds of *pharyngitis*, or *sorethroat*, so far as our own observation extends, occur in this portion of the Southern States;[1] the one very common, the other quite rare. These two forms differ very markedly from each other in many prominent characteristics. Thus, the first is attended with acute pain, much soreness of the muscles of deglutition, and, on that account, much difficulty in the performance of the act. This pain and dysphagia are soon followed by active inflammation of the mucous membrane, shown by redness, dryness, tumefaction, &c. As we have observed the symptoms in this form, all the phenomena show themselves in open, well-marked *paroxysms*, the patient generally enjoying almost entire immunity from the pain during the earlier parts of the day; but in the evening, and sometimes in the evening of the second day after the first

[1] Augusta is on the west bank of Savannah River, at the head of navigation. Latitude 33° 27′ north, longitude 4° 32′ west of Washington. Altitude above tide, 152 feet.

paroxysm, the pain and difficulty of deglutition, the inflammation, &c., all return. If the spine is now examined, *great tenderness* will almost *surely be found* in the upper portion of the cervical region, in the vast majority of these cases. Most of them are relieved by the application of mustard plasters and other revulsives to that portion of the spine with the administration of quinine during the intermission, as in the rational treatment of paroxysmal fever; for this form is, so to speak, a local paroxysmal fever. Indeed, many of the cases are attended with general fever, with the pharyngitis appearing only as a prominent characteristic of the paroxysms.

The other form of pharyngitis referred to, which we have said is also very rare in this vicinity, is nearly allied in all its characteristics to the diphtherite of Bretonneau. There is occasionally met a sporadic case; but the disease occurred here once in the form of a most destructive epidemic—in the months of July, August, and September, of the year 1848, during which time a deplorable number of children in Augusta and its vicinity fell victims. Paroxysmal fever prevailed that year, perhaps to no unusual extent; but in every child affected with this fever, the, at first, fatal marks of this terrible affection would show themselves. The earlier cases, however, were unattended with any febrile symptoms. The child might appear perfectly well until the very disagreeable odor of the breath, or, perhaps, some difficulty of respiration would attract the attention of the parent or the physician. On looking into the mouth, the posterior part of the pharynx would be found covered with the characteristic white secretion or false membrane, and the case, under these circumstances, was often far advanced towards a fatal termination.

We have said that nearly all the earlier cases were without fever, and yet this was by far the most fatal period of the epidemic. As it progressed, fever presented itself in some of the cases as a complication, and this fever was soon discovered to be of a *paroxysmal character*. After this time, the treatment of our cases were conducted upon the principles of antiperiodic medication, quinine, &c., with greatly improved success.

How shall we interpret the facts here presented? We are inclined to believe, and we think that the inference is legitimate, that the disease was in the very beginning of the epidemic essentially paroxysmal; but from the fact that those more prominent characteristics, viz: increased temperature of surface, and an increased and quickened circulation, by which we ordinarily recognize pa-

roxysms, were absent, our attention was not directed to the *paroxysmal element* of the disease, until these more notable symptoms began to appear in some of the cases. Our reason for this opinion is this: after we found quinine so markedly beneficial in the cases accompanied with fever, we administered the remedy in the same manner to *all our cases*, as well *without* fever as with it, and it proved equally efficient in both classes of cases.

We, of course, would be unwilling to assert that diphtherite, as it occurs *everywhere*, is a disease in which the progress of the principal pathologic development, viz: the secretion of false membranes in the pharynx and larynx, is modified or prompted by spinal excitation, or that quinine will, in all cases, arrest the disease. Our object in calling attention to this particular epidemic, occurring in a malarious region, has been to illustrate that the paroxysmal or cerebro-spinal element may, unsuspected, form the *very basis* of a serious disease, which, though nearly allied to fever, is deficient in some of its most notable lineaments. After fever had been recognized as an element of the disease, it was easy to observe that the increase in the white membranous deposition only occurred during a paroxysm, and that by successive paroxysms it was spread from the pharynx to the larynx, where it constituted the fatal *croup* in which so many of the cases terminated.

One of the prerogatives of epidemics seems to be, to impress, as it were, upon the localities over which they have reigned, a *liability* to affections nearly akin to themselves, and we are apt to recognize in kindred diseases ever afterwards, the peculiar expression of their once dominant influence; this was remarkably the case with the dengue of 1850, and not the less so, with the diphtherite of 1848. Each has left its impress upon our region, which is recognized both as complications of other diseases, as well as in sporadic cases of the true affection. The cases of diphtheritis, which have occurred since, have most of them appeared as complications of well marked cases of paroxysmal fever; but a few have arisen independently, and nearly all of these have advanced to the stage of fatal progress before proper remedial means have been applied. Happily, these last have been but few. We might here recount many other important facts in the history of the epidemic diphtherite of 1848, and some few of them not altogether impertinent to the main question under examination; but while these would, doubtless, add a general interest to the records of medicine, they would occupy

many pages, and would scarcely be legitimate in this specific discussion.

The observation that *spasmodic croup* is a paroxysmal disease in certain regions, will not, we feel assured, present itself as a novelty to many practitioners in malarial districts. So fully confirmed are we, from our observation, in the opinion that the attacks which generally occur in paroxysms at night, if allowed to repeat themselves, will finally end in the deposition of false membranes, that we invariably apply the antiperiodic treatment for two days succeeding the first attack, in order to guard against both the quotidian and tertian type of the disease. Where this had been neglected or too long delayed, we have found that these cases, commencing as true cerebro-spinal spasmodic affections apparently at first, involving only the muscular apparatus of respiration, have, by repeated paroxysms, become to be, first, inflammatory, and finally, membranous in their character by the repeated *promptings* of the secretory nerves of the pharyngeal plexus, through the cerebro-spinal centres. Indeed, we regard the administration of quinine, and the application of revulsives to the cervical portion of the spinal column, which is almost uniformly tender, as by far the most important element in the successful management of the disease, as it prevails in this locality.

Pneumonia is a disease which, perhaps as much as any other acute affection, is characterized by a modification in the circulation, the secretions, and also by an alteration of the tissue of the particular organ in which it occurs. As we have studied it in this southern climate, and we are confident that the observation of every attentive practitioner will confirm the remark, *pneumonia most frequently begins in well marked paroxysms.* Some of the cases present this feature so prominently, that after crepitation has been noted in the respiration by auscultation, its advancement can be predicted either day by day, or alternate day by alternate day, with a remarkable degree of certainty. The progress of this change seems to be interrupted during the intermissions of the fever, and even the lateritious sputa denoting the blood-determination, during these intervals will disappear; but will return with increased redness on the accession of the paroxysm. Many of these cases are aborted, so to speak, by the antiperiodic treatment, if early applied. Cupping the cervical and dorsal regions of the spine improves the condition of the patient in a remarkable manner. Most of them require other treatment, of course; but in all

of them the early administration of quinine, and the application of revulsives, are deemed most important elements in the management of the disease.

The importance of the cerebro-spinal and therefore the paroxysmal element of *dysentery* is so justly and so fully dwelt upon, and its rationale so accurately described by our brother, Dr. Robert Campbell, that we here quote from his published Lectures,[1] the account of this affection:—

"As regards the Pathology of Dysentery, gentlemen, there is little necessity for dismissing it among the mysterious and inexplicable problems of our science, or reaching far after its explanation, in assumed connections, which have no substantial basis—when a glance at its anatomical and physiological implements, reveals a more simple theory of its nature. There is an inflammation of some portion of the mucous membrane, lining the large intestine, which may occur from irritation continuously exerted upon that surface, whether that irritation be direct or reflected. It may be, that the fecal mass, through some ulterior cause, becomes detained in its transit along a portion of the canal, until it becomes inspissated and concrete, from the absorption of its fluid particles, the accumulation continuing and the amount of *difficulty* increasing, the longer this constipation lasts, until finally, the irritation, thus induced, is sufficient to call for relief, and incite an endeavor on the part of this violated organ, to rid itself of its hurtful incumbrance —and thus, an excito-motory and an excito-secretory process is instituted, which results in, or rather *constitutes*, the *local* element in this disease. The ulterior or more remote cause here referred to, would seem to be satisfactorily explained, by attributing it to an obtuseness, or we may say, a *paralysis* of the nervous supply of the part; which, if we take into view the fact, that the state of the bowels is in a great measure influenced by the condition of the great spinal centre—as is manifested by the effect of a counter-irritant, a mustard plaster, for instance, applied to the spine, being capable of enhancing greatly the action of a small dose of any laxative medicine—we may with propriety, venture to trace this effect, of the stagnation in this portion of the alimentary canal *to a condi-*

[1] Dysentery, its Pathology and Treatment. Clinical Lectures delivered at Jackson Street Hospital, by Robert Campbell, A. M., M. D., Demonstrator of Anatomy in the Medical College of Georgia, and Lecturer on Clinical Medicine at Jackson Street Hospital, Augusta, 1858.

tion of the spinal cord, as its remote cause. And if we still further proceed to inquire after the ultimate *fons et origo* of causation, we must interrogate those influences in man's relation to the external world, which, acting upon the susceptibilities of his physical organization, are capable of thus determining in an important part of the nervous system—which system enacts and controls all his vital phenomena, whether normal or abnormal—that condition, which may give rise to the manifestations of this disease, apparent to our perception.

"Probably, no fact is better established in pathology than the spinal origin of paroxysmal fevers—which, not always, but often, are accompanied with an inflammation, attacking one or another organ of the body. And it is well understood, that the more serious the inflammatory action, the graver is the type of the fever, and *vice versa*. Now, gentlemen, with such analogous traits before us, what is to forbid our classifying dysentery among those affections—only differing, as it does in the peculiarity of office, and, therefore, in the singularity of construction, properties and relationships of the organ diseased—and which but yields its own characteristic evidences of its suffering condition? As in accordance with the generally received opinion, relative to the exercise of those organs and those functions, which are under the superintending influence of the spinal system of nerves—that their operations are characterized by stages of action, alternating with periods of rest, or intermittingly—the intermittent character of the pains, as well as the other symptoms in dysentery, may be also regarded as indicative of its spinal nature.

"It has been said, that the initiatory stage of this condition was one of constipation of the bowels (though this is by no means always the case), where the effete mass was detained in its receptacle, the large intestine, probably, by the effect of obtunded sensibility or paralysis of its nerves. Now, this idea of paralysis would but illy comport with the known effects of spinal irritation, until it is recollected, that prior to that action being established in the spinal cord, which is denominated "spinal irritation," there must be a stage of congestion or something akin to it, the effect of which condition in a nervous centre, the brain for instance, is known to be that of obtunded sensibility and loss of motion, or *paralysis*. Thus we see, and it is satisfactorily presumable, that whilst the initiatory stage of the intestinal affection is in progress, the inceptional condition in the nervous centre which probably determines it, is contemporary

with it; and in like manner, when the active process begins in the bowel, there is to be found a corresponding, simultaneous activity existing in the spinal cord, constituting spinal irritation—as evi denced by the paroxysmal fever, as well as those enhanced, spinal, excito-motory phenomena which pertain to this disease."

In referring to the diarrhœa which often precedes or accompanies dysentery, he says:—

"Then, we assume the position, gentlemen, that the *diarrhœa* preceding and accompanying dysentery is an *excito-secretory result;* while *dysentery* itself, unaccompanied thus, is, for the most part, an *excito-motory phenomenon.*

"That condition in the nervous centre, which, when from its locality and anatomical connections, is favorable for exerting its influence upon the large intestine, is accompanied with dysentery; when those relations obtain in reference to the small intestine, it is attended with diarrhœa—simply from the fact of the peculiar anatomical construction and functional endowments of this portion of the canal, which, when under the operation of a like influence, yields its different and characteristic manifestations. Let us be understood—that in dysentery there are two co-existing and co-extensive conditions, as manifested by their co-equal symptomatic results, viz: *Spinal irritation*, and an *inflammation in the mucous membrane of the large intestine.*"

From this pathological stand-point we may expect to find the author an earnest advocate of an antiperiodic therapea:—

"It is of the last importance, during an intermission or remission, to stave off a return, or an exacerbation, of fever, with the well known specific, QUININE—that magnificent boon of Heaven to earth. Quinine should be given *unconditionally*, and irrespectively of the other elements of treatment, at such time and in such quantity as will accord with the typal arrangement, and suit the degree of the fever. Many cases occur, wherein, during the first paroxysm of fever, the dysenteric symptoms are very intense, but on the timely administration of quinine, a return of fever is prevented, and there is no further trouble from the dysentery."

And so impressed is he with the importance of this part of the treatment, that his emphatic parting injunction is: "GIVE QUININE IN DYSENTERY!"

The following case will show the connection between paroxysmal fever and *diarrhœa.* It is by no means uncommon, and many will recognize in it, an analogy to cases which have passed under their

own observation. We record it to illustrate our principle—not because it is rare.

CASE 15.—The patient, a gentleman aged about 30 years, at the time in apparently good health otherwise, complains of great tenderness on pressure over the abdominal wall, so that the ordinary movements of the body cause much inconvenience. There is, during the first day, much gurgling in the bowels, and the abdomen is somewhat distended with gas, none passing away from the bowels. These symptoms continue one day, till late in the afternoon, when they subside, and no longer elicit any attention from the patient. On the morning of the second day, the tenderness, the swelling of the abdomen, and the gurgling, return in an increased degree, and continue during the entire morning. In the afternoon, he suffers a severe paroxysm of fever, ushered in by a chill. During the continuance of this paroxysm, the bowels are washed by a most profuse *diarrhœa*. The discharges were thin and watery in character, evincing in their appearance an entire absence of the biliary secretion; they were nearly white. *There was much tenderness of the spine*, through almost its entire extent. During the paroxysm, the patient was oppressed with sleep, approaching to stupor, but otherwise than above narrated, the phenomena of the attack varied little from an ordinary paroxysm of fever. On the subsidence of the paroxysm the next day, the diarrhœa and other abdominal or enteric symptoms passed off. Quinine was administered freely for two days, and there was no return of the fever, or any of the other symptoms.

The secretions of the bowels and liver here, it will be admitted, were modified very greatly by the condition of the system upon which the other phenomena of the paroxysm depended, and if we admit that that condition pertained to the cerebro-spinal system, and we think in the present stage of our discussion, this is unavoidable, the rationale heretofore offered by us will account for these complex phenomena.

It will be seen that, in presenting the above series of facts, we began with the more external and notable, and have gradually advanced to the more obscure and hidden; till, finally, our consideration of those phenomena, which are, perhaps, the most ordinary concomitants of malarial fever, but yet, which are at the same time, the most mysterious, are presented, as it were, only at the end of

"a long series of previous observations, tending to the same effect."[1] Analogy, as has been said, though a useful stimulus and guide to investigation, is, *by itself*, a very doubtful guarantee of truth; yet there are many departments of knowledge, which, at certain stages of their progress, have owed much to this mode of investigation. "High truths, like high mountains," says a great metaphysician,[2] "are apt to veil themselves in clouds;" and, as analogy has been called "the ladder to remoter truths," we have endeavored to ascend by it, to the higher region of their elevation, that, if possible, we may seize upon them, more clearly define and enunciate them—not alone in the strength and beauty of their separateness, but in the broad proportions of their higher relation and deeper harmony with the fundamental doctrines of established science.

THE LAW OF PERIODICAL EXCITO-SECRETORY ACTION.

It will be observed in the quotation presented by us on page 605 of the present paper, that the author evidently had had suggested to him the idea of cerebro-spinal influence upon the tissues of the organs, through the ganglionic system. He even discusses it, but finally rejects it as unworthy, and insufficient to explain the problem. This is by no means without precedent in the history of scientific progress. "It must inevitably happen," says Whewell,[3] "that men will lose their hold on the knowledge which the great discoverers who preceded them have brought to light. They are not able to push forwards the truths on which they lay so feeble and irresolute a hand; probably they cannot even prevent their sliding back towards the obscurity from which they have been drawn, or from being lost altogether." So has it been with this particular subject. Certain authors, years ago, with an acuteness, far in advance of their age, and even before the announcement of reflex action by Marshall Hall, had shrewdly *surmised* that an influential relation might subsist between these two systems of nerves, and that this might possibly unravel the tangled skein of febrile phenomena; and, consequently, "Sympathies" and "Synergies" became frequent and familiar words on the page of science; but even at this very time, the idea was only held by "a feeble and

[1] Whewell's History of the Inductive Sciences.
[2] Dr. M'Cosh, of the Queen's University in Ireland.
[3] Op. citat., vol. i. p. 254.

an irresolute hand," and was allowed to slide back into obscurity, and the potency of this reflex influence to bring about the results, was, as we have seen, soon positively denied. Thus, this only clue to the explication of all the facts—this true *filum labyrinthi*—which despair had caught at, was, in despair, relinquished. There was not then, as now, an established, recognized, and demonstrated physiological principle, to render the explanation legitimate, and, as we have before said, because these philosophers could not legitimately attribute *all* the phenomena directly to the cerebro-spinal system, they determined to attribute none. This determination has greatly retarded the progress of science in this department.

Rightly to propose a problem, it has been said, is no inconsiderable step towards its solution. Although *our* problem has been kept very constantly before us, from the beginning of this paper, it behooves us now to state it even with greater distinctness, ere we enter more particularly and specially into its solution.

If the cerebro-spinal system is the primitive dynamic source of all the phenomena of paroxysmal fever, how shall we account for: The variations in temperature, and for the altered secretions and the structural changes in those organs which are not directly supplied by that system and whose actions, neither normal nor abnormal, are such as indicate cerebro-spinal innervation? And secondly, Why do these changes observe periodicity, which is a characteristic of the cerebro-spinal, and not of the ganglionic system, which latter directly governs the parts in which they occur?

The *conditions* of this problem we have in the foregoing parts of this essay endeavored studiously to establish, by the collocation of a vast number of facts from every source, not only within our experience, but also within our reach. These we have diligently applied to our subject in every manner that the rules of legitimate reasoning would allow. The examination of the phenomena of the nervous system, of the phenomena of fever itself, and the application of the various kindred analogies to the main question under discussion, have so far illustrated our subject that these last steps in the investigation, we hope, will be relieved of many of the embarrassments involving it at the beginning.

We have already shown that the chief difficulty in the question "How shall we account for the variation in *animal temperature, altered secretions, structural changes*, &c., in organs directly supplied only by the ganglionic system?" is to be answered in the full recognition which, the influence of the cerebro-spinal centres over the ganglionic system has gained by the establishment of the excito-

secretory function. It remains now for us more particularly to show *why* these changes in organs under the sway of the ganglionic system come to observe *periodicity*, when this periodicity has been fully shown to be adverse to the *method* of that system. This, then, is the part of the problem which shall now engage us, and during its examination the other portions must necessarily come, even more fully than heretofore, under our consideration.

The great astronomer, La Place,[1] in order to explain the periodicity of *tides*, constructed the following remarkable proposition, which, though found inefficient perhaps in physics, appears to us most beautifully applicable when transferred to medicine: it serves to make more pointed our course of inquiry into the action of the *cerebro-spinal* upon the *ganglionic* system, in their reciprocal relations to febrile diseases. Indeed, at this point of our investigation, it may almost be said to answer the question. It is this: "*In a system of bodies acted upon by forces which are periodical, the state of that system must be periodical like the forces.*"[2]

Now, it has been shown that those organs, as the liver, spleen, intestinal canal, indeed all the viscera and tissues of the entire animal structure, are a number of bodies whose common vascular system is controlled by the ganglionic or secretory system of nerves in their ordinary actions; and further, that the secretory function of these organs, and the animal temperature everywhere, are all due to the direct influence of this same system of nerves; and again, that under its *unmodified* sway, the various organs and their functions present little or no variation in their mode of action, but are conducted in that continuous, even, regular and silent manner so characteristic of the normal life of this organic system of nerves. The heart and arteries maintain their unvarying rhythm and their appointed 60 to 75 pulsations per minute, during the whole of the healthy existence of the individual; the *temperature* of the body maintains about its 100° of Fahrenheit; while the *blood changes* and *cell changes*, the *metamorphoses of the tissues*, and also the many more strictly *chemical* phenomena—indeed, every detail in the multiplex process of nutrition goes on with uninterrupted, though unobserved regularity. The various *secretions*, which are but the result of those more recondite movements, are eliminated with the same unvarying and monotonous persistence; the liver, the kidney, the intestines all observing the same law in this regard; while the circulation of

[1] Méchanique Celeste, tome ii. p. 218.

[2] Italics ours.

the spleen progresses, like the rest, under that even sway which "governs the thousand secret processes of the living body."[1]

Such, as we have seen, is the nature of all our organic actions, and such would they ever be were man, like the polype, possessed of *only* a ganglionic system, or, like the monster described by Dr. Davey,[2] deficient in both brain and spinal marrow. But Human Anatomy teaches us that this quiet, silent, undemonstrative, though most potent *ganglionic* system is intimately connected with—indeed, so to speak, engrafted upon, the *cerebro-spinal* system, by multitudinous attachments, in very many portions of the organism. It has also been abundantly shown that, in consequence of this intimate connection between these two systems, there results a relation, by virtue of which, the *cerebro-spinal* with all its susceptibilities to the influence of external agencies, its devoted subservience to the inexorable law of periodicity, has the power, under peculiar circumstances, of acting upon and exciting to the utmost, every one of the varied capabilities of the ganglionic system. It is by the establishment, then, of the excito-secretory function of the nervous system that we are enabled to apply, with a confidence equal to the assertion of an axiom, this transferred proposition of La Place; for it is only since that time[3] that it has been shown clearly that "this system of bodies," the parts supplied by the *ganglionic* nerves, could be "acted upon by forces which are periodical," viz., the *cerebro-spinal* system.

If, now, the question be propounded—"Why do these organs manifest their changes *periodically* during malarial fever?" it may be answered thus: "*Because these organs are a system of bodies acted upon by forces which are periodical, and the condition of the bodies are, therefore, necessarily periodical, like the forces 'which act upon them.'*"

This proposition, which has been rejected in the department of physics, for which it was constructed, we have thus transferred to medicine; and in doing this, we have but *enunciated* THE LAW[4] *of periodical excito-secretory action.*

By the application of this law, it will hereafter be seen that malarial fevers are to be separated from all the other NEUROSES, in which, by their *ordinary* phenomena, they constitute a distinct and peculiar *class*. Recognizing this, as the law of periodical excito-

[1] Bichat, op. citat.

[2] London Lancet, June 25th, 1853.

[3] 1850.

[4] "A law of Nature is simply the expression of the mode or manner in which a cause or power operates."—*Particular Providence*, by Rev. R. K. Porter, p. 26.

secretory action necessarily constitutes it, as conspicuously, THE LAW OF PAROXYSMAL FEVER; *for paroxysmal fever, in its intrinsic and elemental nature, is, in all its varieties, essentially nothing more*[1] *nor less than a vast representation of a widely extended and universal periodical excito-secretory action, throughout the entire organism.* It is only when recognized in this light and known by this name, that any doctrine can grasp in one intelligible and consistent whole, the diverse multiplicity of phenomena presented by malarial fever.

THE LAW OF PERIODICAL EXCITO-SECRETORY ACTION APPLIED TO THE HEART IN MALARIAL FEVER.

Having thus shown that the *assemblage* of organs in both the thoracic and abdominal cavities may be made to manifest alterations in their actions and conditions *periodically* through the influence of the cerebro-spinal centres and nerves, let us now consider the manifestation of our law in the case of a few of the special organs.

The *heart*, it is well known, recieves its innervation from two distinct sources; first, the pneumogastric or par vagum sends several cardiac branches which cross the arch of the aorta, and some of these, mixing with certain ganglia of this region, the heart is thus supplied with a certain amount of both pure and mixed cerebro-spinal nervous influence. This amount varies in different subjects; in one notable instance, the remarkable case of Captain Townsend, the communication appeared to be so direct, that the individual possessed the power of voluntarily controlling the pulsations of the heart, and could "either faint or die, at will;" but in the vast majority of cases, the normal action of the heart, as physiology has shown, is neither under the direct control of the will, nor is it dependent upon the cerebro-spinal system nor any cerebro-spinal centre whatever; but upon, second, the ganglionic system which supplies it most abundantly in the cardiac plexuses.

In the year 1811, Sir Benjamin Brodie performed a number of

[1] When we say "nothing more," it must be understood that we do not, *for a moment*, ignore the condition of THE BLOOD; we are speaking now of *phenomena*, the nervous system is recognized in these phenomena, but the blood, as we have before said, and will hereafter more fully show, *underlies* all these phenomena as the primal causal force moving the nervous system to the *expression* of them all. Hence in our problem, p. 632, we characterize the nervous system as only the primitive *dynamic* source, &c.

most brilliant experiments to determine the amount of influence which the brain exerted over the heart's action, the detail of which we find in the work heretofore referred to.[1] "In making experiments on animals," says this distinguished physiologist, "to ascertain how far the influence of the brain is necessary to the action of the heart, I found that in an animal in which the spinal cord had been divided, in the upper part of the neck, respiration was immediately suspended, while the heart continued to contract, circulating dark-colored blood, and that in some instances, from ten to fifteen minutes elapsed before the heart's action had entirely ceased.

"I further found that, when the heart was removed, the divided bloodvessels having been secured by a ligature, the circulation still continued apparently unaffected by the entire separation of the brain. These experiments confirmed the observations of Mr. Cruikshank[2] and M. Bichat[3] that the brain is not directly necessary to the action of the heart, and that when the functions of the brain are destroyed, the circulation ceases only in consequence of the suspension of respiration. This led me to conclude that, if respiration were produced artificially, the heart would continue to contract for a still longer period of time after the removal of the brain. The truth of this conclusion was ascertained by the following experiment:—

"*Experiment I.*—I divided the spinal cord of a rabbit in the space between the occiput and atlas, and having made an opening into the trachea, fitted into it, a tube of elastic gum, to which was connected a small pair of bellows, so constructed that the lungs might be inflated, and then allowed to empty themselves. By repeating this process once in five seconds, the lungs being fully inflated with fresh atmospheric air, an artificial respiration was maintained. I then secured the bloodvessels in the neck, and removed the head by cutting through the soft parts above the ligature and separating the occiput from the atlas. The heart continued to contract apparently with as much strength and frequency as in a living animal. I examined the blood in the different sets of vessels, and found it dark-colored in the vena cava and pulmonary artery, and of the usual florid red color in the pulmonary veins and aorta. At the end of twenty-five minutes from the time of the spinal cord being

[1] Physiological Researches, p. 2.
[2] Philosophical Transactions, 1795.
[3] Recherches Physiologiques sur la Vie et la Mort.

divided, the action of the heart became fainter, and the experiment was put an end to."

In his second experiment, "the subject being a middle-sized dog," life was maintained for a much longer time. At the end of two hours and a half, the pulse had fallen to "35 per minute, and artificial respiration was no longer continued."

He repeated this experiment a great number of times, and always with the same result in this particular, viz., the action of the heart seemed but little affected so long as respiration was artificially maintained.

As it may be here objected that the vagi arise probably below the point at which Sir Benjamin Brodie made his section (which experiment was performed in reference to the influence of the *brain* more than any other nervous centre) we refer the reader to the experiments of Dr. John Reid,[1] whose investigations were made to establish this special point, viz., the amount of influence exerted by the pneumogastric cerebro-spinal *nerve* upon the movements of the heart. Both vagi and sympathetics were cut in the middle of the neck in some seven or eight dogs, and yet the heart continued to act, and also to be modified by the fear excited in those animals by the experimenter. He finally arrives at the following conclusions, which appear to us to be just: "These experiments are, we conceive," says Dr. Reid, "sufficient to prove that, after section of the vagi the pulsations of the heart may not only be quickened by muscular exertions, but also by mental emotions. Though in all probability the vagi are the usual channels through which the mental emotions affect the heart, yet it appears from these experiments that they may also take place through the medium of the ganglionic system of nerves."

In addition to the above facts which favor the opinion that the heart's actions are sustained principally by the ganglionic system, we may refer to the remarkable and conclusive cases recorded by Dr. Marshall Hall and Dr. Davey. In Dr. Hall's case, a fœtus was examined at full term and found deficient in the entire brain, while in Dr. Davey's case, there was no trace of either brain or spinal marrow, and yet the action of the heart and all the nutritive processes had been carried on for nine months, solely by the ganglionic nervous influence. Yet we here quote a case of Robertson's, referred to by Henle, in which "he testifies to the influence of the

[1] Anatomical, Physiological, and Pathological Researches, p. 170, 1837.

cervical portion of the spinal marrow upon the motions of the heart, where, after a wound of the cervical vertebræ which injured the vertebral canal, attacks of syncope occurred, with extraordinary slowness of the pulse." Dr. Brown-Séquard, the range of whose experimental investigations comprehend almost every department of nervous physiology, has made some ingenious researches on the nervous forces governing the movements of the heart. Sir Benjamin Brodie's experiments, as we have seen, refer to the brain, Dr. John Reid's to pneumogastric and sympathetic nerves, those of Dr. Brown-Séquard are intended to investigate the relation of the medulla oblongata to the movements of the heart.[1]

"There is no part of the nervous system considered as more essential to life than the medulla oblongata. In the last few years, many German physiologists have asserted that this nervous centre is the source of the rhythmical movements of the heart. Besides, an eminent physiologist maintains that, in the medulla oblongata, a small part exists, which is the focus of vital power. Moreover, it is certain that the medulla oblongata has a great share in the respiratory movements, therefore it seemed probable that the ablation of such an organ, even in cold-blooded animals, ought to be speedily followed by death. Such, however, is not the result of that operation; and in favorable conditions, the batrachia, for instance, can live more than four months after the loss of the medulla oblongata. During all that time, these animals, in appearance, remain in good health, and I have observed in them the existence of all the following functions and properties:—

"1. The circulation of the blood continues as well as in unmutilated frogs. *The beatings of the heart are at first quickened, generally during half an hour, an hour, or an hour and a half after the operation;*[2] they then return to their normal rhythm and they are found as regular and vigorous in frogs deprived of their medulla oblongata for several days or even for several months, as in healthy frogs. Sometimes, particularly when the hemorrhage has been considerable, the beatings of the heart become less numerous and less energetic; then the animal dies very quickly, but if it lives, the movements of the heart resume, before long, their normal rhythm and strength."

Dr. Brown-Séquard extends his researches through the various classes of animals; amphibia, reptilia, fishes, birds and mammals;

[1] See Bulletin de la Soc. Philomatique, Paris, 1849, p. 117; also, Physiology and Pathology, by E. Brown-Séquard, New York, 1853, p. 40.

[2] The Italics are ours.

but that which we have quoted above, refers more definitely to the heart. It will be seen by his experiments on the frog, that, while the medulla oblongata is plainly not necessary to the heart's movements, yet an irritation made in it was capable of *quickening its movements;* thus, "*the beatings of the heart are at first quickened generally during half an hour, an hour, or an hour and a half during the operation.*"

The heart is a viscus which, from the character of its relations to the other organs of the body, must necessarily have imposed upon it such a constant and imperative conformity to so vast a number of influences, that when we endeavor to estimate the various sources of its movements, the task becomes one of great difficulty, liable to end in no very definite result. The blood acting as its irritant; its own inherent muscular irritability, the presence of ganglia within its own substance and its evident supply of both cerebro-spinal and ganglionic nervous influences, render its study very complex and unsatisfactory. Yet, notwithstanding all this obscurity, it is very manifest that, no organ of the body is more extensively correlated in regard to the influences which govern it, than the heart is; the emotions of the mind, the conditions of the abdominal viscera, and the state of every portion of the body, no matter how remote from the heart itself, is most familiarly known to modify its movements, the complaints from the most distant portion of the organic realm apparently being heard and quickly responded to, from this citadel of life.

The following researches of several physiologists, though not entirely conclusive, certainly give strength to our views:—

A series of experiments intended to determine the influence of the various nervous centres upon the action of the uterus, and other viscera, have been recently performed by Dr. O. Spiegelberg of Gottingen.[1] His discussion of the subject shows the manner in which distant organs in a state of irritation can modify the heart's action through the conductive function of the spinal cord. "Irritations produced in the central parts are conducted along the medulla oblongata and the spinal cord downward, and reach the uterus through the branches of the sympathetic nerve connected with the cord, and through the sacral nerves; while irritations originating in the uterus, travel the same route *in an opposite direction*[2] to the

[1] *Vide* North American Medico-Chirurgical Review. July, 1858.

[2] The Italics are ours.

central parts. This proposition is rather inferred from foregoing reasons, then proved by experiment. As irritations originating in the cerebellum are not conveyed along the par vagum, but go downward along the spinal marrow, which has only sympathetic connections with the abdominal viscera, the bridge from the spinal marrow to the uterus has to be sought in these communicating branches." Martin and Maurer observed an increase and diminution of the frequency of the pulse in connection with labor-pains, and this writer according to his proposition, thinks that these phenomena "are not to be explained by the excitation of the uterus being transmitted through the sympathetic and par vagum to the heart; but by its being conducted along the cord to the medulla oblongata, whence it is transferred to the pneumogastric, thus producing the increase in the heart's action." Carpenter remarks that, irritation of the roots of the upper cervical nerves stimulates the action of the heart, through the sympathetic branches, in the dog.

From the above, and more especially from the incidental result of Dr. Brown-Séquard's experiment on the medulla oblongata, when during the irritation produced by the experiment, the heart's action was modified, we may legitimately conclude that, it is not only a "fact of observation" but also "a consequence of reasoning," that an irritation in any of the spinal centres is capable of modifying the action of the heart fully as powerfully, as though that irritation were located in the ganglionic centres, or applied to the sympathetic branches themselves, which are distributed to the heart. It is seen also, by the above observations of Speigelberg, *how* an irritation, as labor-pains, in a distant organ, can modify the heart's action, and by an increase in its *frequency* and *force*, cause it to present those two most notable characteristics of the *fever-pulse*. It will here be remembered that in the foregoing parts of this paper, our own observations on cases herein reported,[1] substantiate the fact that, various injuries and other causes of irritation at the *peripheral extremities* of sentient nerves, as in the case of wounds, abscesses, burns, and surgical operations, in any portion of the sensory surface are competent to produce fever, and further, that this fever is of a paroxysmal character and if allowed to return, is capable of materially retarding the curative processes going on in the tissues, by provoking the pus-secretion by a true reflex excito-secretory action. We are now prepared to understand how this increased

[1] Page 610.

action of the heart and arteries is brought about; for, if as experiment has shown, an irritation of the roots of the upper cervical nerves can be reflected through the spinal centre and influence the heart through the ganglionic system; nay, if an irritation located even so distantly as in the womb, can propagate its influence to the heart, and cause its increased action through the sympathetic and sacral branches, certainly a more active and acute irritation, as a forming abscess, a punctured or a lacerated nerve, in the skin, that very surface which is *intended* as the wide-spread peripheral *excitor* for the whole of both, our reflex-motory and reflex-secretory acts, must be admitted as competent to produce that similar increase in the heart's action, which we observe in traumatic fever of this kind.[1] That these fevers assume the paroxysmal form, and the reason for their doing so, we have fully heretofore shown.

Finally; if irritation at the *peripheral extremities* of sensory nerves is competent to modify the heart's action, and in that modification, cause it to present all those characteristics of periodicity which we have shown do obtain in these traumatic fevers; certainly, for a much stronger reason, must the conclusion be inevitable, that an irritation located in the spinal centre itself, *even though it should not be the particular centre giving attachment to the branches immediately supplying the heart*, would fully account for the same phenomena when observed in paroxysmal fever.

We do not feel that it is necessary to adduce further argument to prove that the heart's action is susceptible of being modified either *directly*, by irritations in the ganglionic system of the organ itself, or in a *reflex manner*, by irritations in either the cerebro-spinal nerves or centres, for so numerous are the avenues by which stimuli may reach and control it, that our difficulty lies, more in selecting from them which we shall present as illustration, than in making extended research for facts to establish the truth.

Since, then, at the end of these considerations we may legitimately conclude that the *heart* (which, it must be remembered, is, philosophically considered, but an *artery*, modified and adjusted to a particular end), like the bloodvessels, is ever responsive to influences residing in the cerebro-spinal system, we may now apply our *law* as aptly

[1] We do not refer here to that fever which occurs from wounds, under greatly enfeebled states of the system, with purulent degeneration of the deeper tissues, which is generally and more properly termed hectic. Fevers of this kind belong to another class entirely; a class in which the causes operate upon the ganglionic system *directly*, without the intervention of the cerebro-spinal.

to its movements, as to the other phenomena of fever; thus, *the heart is subjected to paroxysmal manifestations of excitement in malarial fever*, BECAUSE *the forces which act upon it, in these fevers, being periodical, its state is necessarily periodical like these forces.*

THE LAW OF PERIODICAL EXCITO-SECRETORY ACTION APPLIED TO THE SECRETIONS IN MALARIAL FEVER.

In our former *resumé* we presented cerebro-spinal fevers as "*all paroxysmal—the secretions and nutrition being only secondarily affected,*" let us now examine how these changes, both in the secretions, and even in the condition of the tissues of the several organs, may be produced, and in what manner the law of periodical excito-secretory action is expressed in this particular class of phenomena.

These phenomena, which in their nature indicate none of the characteristics of cerebro-spinal innervation, except that remarkable one of *periodicity*, pertain as we have before said, entirely to the *secretory* system, but yet present themselves, so interwoven with the essential cerebro-spinal phenomena of malarial fever, that their etiological connection is undeniable. In the earlier parts of this essay we have already presented such a vast number of facts to prove that the cerebro-spinal centres and nerves have the power of influencing the ganglionic, both in the elimination of the *secretions*, and also in the *alterations of the tissues* that, now on the application of our principle to that feature of periodicity inherent in these fevers, it will only be necessary briefly to refer to these organs, citing a few others, which perhaps are no more remarkable. We will first refer to some of the secretions affected in paroxysmal fever, and what is remarkable about these modifications in the secretions is, that they manifest themselves principally, *during the paroxysm*, the organs resuming their normal secerning function during the intermission, again to have them deranged in the *succeeding* paroxysm. Some of the more prominent of these are the secretions about the mouth, as on the tongue, the lachrymal secretion, those of stomach and intestines, the secretion of liver, and also the urinary secretion, and cutaneous transpiration. All these are more or less affected, either in quantity or quality, or perhaps both, during some period of the paroxysm, as we have seen in the recountal of the phenomena of fever, heretofore given. We have shown in one of our

cases,[1] which we select only because it is more striking than the others (for that the secretions are modified is a *universally* acknowledged fact), that, during the paroxysm, the patient was affected with diarrhœa of the most copious character, which subsided with the decline of the fever, and after several returns, was relieved on the cure of paroxysm by quinine. Here was a case showing, in a marked manner, the periodical aberration in the secretions, of a *very* extensive surface, which aberration was so intimately connected with the paroxysm, that it constituted its most alarming concomitant. How could the occurrence of the paroxysms which we have so repeatedly referred primarily to the cerebro-spinal system, give rise to this manifestation, in such exact teleological accordance with the surface in which it occurred, and yet which is known to be *outside* of the dominion of that system? The experiments bearing on this question are, as we have seen, by no means meagre, either in their number or in their significance. We have often referred to those of Dr. Claude Bernard upon rabbits and other animals, to develop the fact that impressions made *directly* upon particular cerebro-spinal centres, had the effect of modifying the amount, and also the quality of the secretions of certain of the abdominal viscera; thus, the direct irritation with a sharp instrument, of the upper surface of the medulla oblongata was found to modify and increase the secretions of the liver and kidney, in accordance with the locality irritated, and also in proportion to the depth to which the instrument was inserted; sugar, or albuminous matters appearing in the urine, which itself was scanty or profuse, according to the manner of the experiments.[2] We had previously shown[3] that the *peripheral* irritation of dentition through the fifth nerve, was competent to modify, by excito-secretory action, not only the secretions of the kidney and liver, but those of the intestines likewise, giving rise to the modified condition of the tissues observed in the *cutaneous eruptions* and mucous ulcerations of cholera infantum. We now record the observation—in illustration of which we might adduce numerous cases—that, during the irritation of dentition, and the cholera infantum concomitant therewith, there are *paroxysms of diarrhœa, observing distinct periods of the day; being as well defined as any quotidian or tertian paroxysms.* This

[1] See page 630.

[2] These Lectures were delivered at the College of France, in 1854 and 1855, and published in Paris in 1855 and 1856.

[3] June, 1850.

is so frequently the case, that it doubtless has elicited the attention of many beyond our personal acquaintance; it has been noted by many practitioners with whom we have conversed, and quinine is, consequently, with not a few of us, an important element in the treatment of cholera infantum. Were we now asked, Why are these manifestations periodical, as well as the manifestations of aberration in *all* the secretions, during paroxysmal fever? With all the facts before us, we may as legitimately answer here, as we have in the case of the heart, by appealing to that law, which we have shown, expresses the *method of all these acts of periodical secretion;* viz., thus, *these secretions of malarial fever and cholera infantum are periodical, because, under these circumstances, the system of bodies or organs from which they are eliminated, are being acted upon by forces which are periodical, and the secretions are necessarily periodical, like the forces acting to produce them.*

THE LAW OF PERIODICAL EXCITO-SECRETORY ACTION APPLIED TO THE ORGANIC STRUCTURAL CHANGES IN MALARIAL FEVER.

In relation to the *structural changes* occurring during paroxysmal, or cerebro-spinal fever, the same may be said of them, as we have seen, that was said of the secretions; they are admitted by all to vary, especially at first, with the accession and decline of the paroxysm; indeed, this admitted and established fact—as we have shown by our quotations from various authors (see p. 580), appears to have been the stumbling-block, to a great many, in the way of their adoption of the cerebro-spinal doctrine of malarial fever. Can, then, the condition of the cerebro-spinal centre modify organic structure? The observations are far more numerous than the experiments bearing upon this portion of our subject, yet some of the latter are very significant. Let us refer, first, to some of the observations to establish this point. Henle notes the following, which have been recorded by various authors, and as they refer more particularly to structural changes, than to secretions, we have preferred to place them under this head:—

"In proof of the dependence of the vascular nerves upon the brain and spinal marrow, we may further adduce—the excretions of persons hanged, and of paraplegic persons, the œdematous swellings in the epidermis, and particularly in the serous and mucous membranes of parts which are paralyzed by injury of the spinal

marrow, or lie within the affected parts, the inflammations and ulcerations in the kidneys, and the mucous membrane of the bladder, after injuries of the medulla spinalis, perhaps, also, the extensive abdominal inflammations which Schiff observed after section of the *thalamus nervi optici.* I will also here mention the inflammation of the *uvula*, connected with inflammation of the cervical portion of the spinal marrow, the peritonitis and nephritis connected with inflammation of the medulla spinalis, *the gastro-enteritis, in hemorrhage, inflammation and ramollissement of the brain and spinal marrow,*[1] the softening of the stomach in meningitis of the base of the brain," &c.

The only *experiments*, which we are aware of, that have been made, the results of which, when interpreted by us, illustrate the influence of the spinal centres upon the tissue of parenchymatous organs, not *directly* under the dominion of the cerebro-spinal system; but we may say, wholly supplied by the ganglionic, we owe to the ingenuity of that brilliant experimentalist, Dr. E. Brown-Séquard. His researches were made mostly on guinea-pigs, and we have quoted them prettly fully on page 566 of the present paper. These results, when applied to the purposes of our present induction, are most valuable, for they demonstrate very conclusively that irritation made in a *spinal centre* is capable of producing *congestions* and *engorgements*, the very forms of vascular disturbance observed in paroxysmal fever, in the structure of a *parenchymatous* organ, the supra renal capsule, in a few hours. "A simple puncture of the cord is frequently sufficient to produce the congestion of both suprarenal capsules." Upon this last valuable fact of M. Brown-Séquard's —did we possess no other—we might legitimately base many of the conclusions necessary for the development of our proposition.

But there are others—facts of *observation*, which, when taken in connection with the above series of experiments, and our previous conclusions on this subject, become very closely and legitimately allied to our fundamental proposition. Professor S. H. Dickson[2] thus supplies a case in which an external organ—the penis—after the manner of the testicle in our own cases, heretofore mentioned, and which have the same force of illustration, was the seat of the periodic congestions of the paroxysm, and finally suffered permanent induration. "I should not omit," says this author, "to allude to a curious, and, as far as I know, singular exception to the dispo-

[1] General Pathology. [2] Elements of Medicine.

sition of these congestions to affect internal organs. We had in our museum a long while, though now lost, the preparation of a penis, which had suffered during a protracted attack of intermittent, the same, or analogous engorgement, enlargement and induration, which usually derange the spleen in agues, being obviously the seat of the congestive determination, familiarly taking place in that viscus. They possess the erectile tissue in common. The case occurred in our almshouse,[1] and was witnessed by a large number of physicians, none of whom entertained any doubt of its nature. The history of a case very similar, in which the same organ was attacked with congestion, or vascular turgescence, during the paroxysm, was sent me by Mr. S. I. Parker. It occurred in one of the interior counties of the State of New York." We dwelt so fully and minutely on our own cases of furuncle, of surgical and other wounds, as well as congestion of the eye, in which nearly all the elements of the paroxysmal change of tissue were accurately observed, that we only remind the reader of them now, while we add to them the statement that we have frequently witnessed the same peculiarities in the mamma, while undergoing the process of suppuration, which process may often be arrested or aborted by the administration of quinine, judiciously adjusted to the typal peculiarities of each case.

Now it is known that the *liver*, *spleen*, *kidney*, and both the *small* and *large intestines* are the organs in whose tissues, in one form or another, the *structural lesions* of malarial fever are most prone to occur. These organs obtain their nervous supply, like the supra-renal capsule, almost exclusively from the ganglionic system, the roots of their sympathetic branches uniting with the cerebro-spinal centres by numerous attachments, so that we may legitimately infer that an irritation of the cerebro-spinal centres, even which is not mechanical, *but caused by the vitiated fluids supplying or coming in contact with it*, will powerfully influence these various organs in the same manner as the experimental irritation has been found to affect the supra-renal capsule. Since, as we have seen by the most abundant testimony, that there is always a considerable amount of irritation located in the spinal centres, and as the very character of the phenomena of malarial fever has fully indicated, we may feel very confident in the belief that the changes found in the organs above referred to, are, as we have said, but the secondary results of the cerebro-spinal irritation. Why all these phenomena

[1] Charleston, S. C.

occur periodically, is to be answered in the express words of the law applied to the phenomena heretofore examined: *In a system of bodies acted upon by forces which are periodical, the state of that system must be periodical like the forces.*

THE LAW OF PERIODICAL EXCITO-SECRETORY ACTION APPLIED TO THE THERMAL PHENOMENA OF MALARIAL FEVER.

The remarkable and very uniform aberrations of *animal heat*, in patients laboring under diseased action, have been for many years the subject of the most vigorous experimental inquiry, and a vast amount of valuable testimony has been recorded to substantiate the various theories proposed in explication of the mysterious phenomenon. Lavoisier and La Place seem to have enunciated the theory,[1] "that the temperature which a warm-blooded animal possesses above that of the atmosphere, was entirely explained by the consumption of oxygen in respiration."

At this very time, 1812, when this opinion with regard to the source of animal heat was universally received, Sir Benjamin Brodie, with a modesty, as becoming in the young as it was prophetic of his present greatness, began to question the consistency of the theory; and thereupon, instituted a series of experiments on living animals, and collected facts of his own observation and that of others, which, if they did not result in the entire subversion of the doctrine, they certainly started experimental investigation in an *entirely new direction.* Since then, a vast accumulation of varied facts afford the data from which we may hope that the truth will be attained.

"Of opinions," says our author, "sanctioned by the names of Black, La Place, Lavoisier, and Crawford, it is proper to speak of with caution and respect; but without trespassing on these feelings, I may be allowed to say that it does not appear to me that any of the theories hitherto proposed afford a very satisfactory explanation of the source of animal heat."[2] He then presents a number of observations made upon cases, wherein accidental injury received in the brain and cerebro-spinal centres was followed by decided modification of animal temperature; and this effect was produced irre-

[1] Physiological Researches. By Sir Benjamin Brodie. Additional Notes, p. 116.
[2] Op. cit., p. 33.

spective of the influence exerted by such injury on the frequency and depth of the respiration. "While certain lesions of the nervous system," says he, "cause a diminution of the vital temperature, the following history justifies the conclusion that there are others which may produce the opposite effect, and cause its elevation above the natural standard. A man met with an accident which occasioned the forcible separation of the bodies of the fifth and sixth vertebræ of the neck, attended with effusion of blood within the theca vertebralis, and a laceration of the lower part of the cervical portion of the spinal cord. It is well known to surgeons, that under such circumstances inspiration is always very imperfectly performed by means of the diaphragm only, without the assistance of the ribs; while, in consequence of the paralyzed state of the abdominal muscles, expiration depends altogether on the pressure of the abdominal viscera acting on the relaxed diaphragm. The patient, in this instance, died at the end of twenty-two hours from the period of the injury, and for a considerable time previous to his death, breathed at very long intervals, the pulse being weak and the countenance livid. At last, there was not more than five or six inspirations in a minute. Nevertheless, when the ball of a small thermometer was placed on the inside of the groin, the quicksilver rose to 111° Fahrenheit. Immediately after death the temperature was examined in the same situation, and found to be still the same. "Although," he continues, "the elevation of temperature to so great an extent may not be a very frequent occurrence, cases must be in the recollection of every physician and surgeon, in which, under certain morbid conditions of the nervous system, the natural temperature was fully maintained at the same time that the respiration was so slow and imperfect as to indicate that the consumption of oxygen in that process must have been greatly diminished." He further adduces several remarkable cases from the writings of Dr. John Hunter,[1] who also, it appears, had objections to the chemical doctrine of the production of animal heat. "A remarkable case fell under my observation of a gentleman who was seized with an apoplectic fit. He lay insensible in bed, covered with blankets. I found his whole body become extremely cold in every part, and continue so for some time, and in a short time become extremely hot. While this was going on for several hours, alternately, there was no sensible alteration either in the pulse or in the breathing."

[1] Lectures, 1780, 1787.

His *experiments* directed on this point are very numerous, and consist both in injuries inflicted on the spinal centres, and also in the introduction of poisonous agents, as the oil of bitter almonds and woorara, into the blood. These poisons are known to depress rapidly the vital powers, and to cause also the rapid diminution of animal heat. Notwithstanding the respiration was artificially maintained, still there was a rapid decline in the animal temperature. Under these circumstances, if the respiration be kept up until the effects of the poison cease, as the animal recovers his sensibility, so does he also recover the power of generating heat; but it is not till the nervous energy is completely restored, that heat is produced in sufficient quantity to counteract the cold of the surrounding atmosphere. From these experiments of Sir Benjamin Brodie, it was also developed that when the brain is cut off from the spinal cord, or its functions suspended by the agency of a narcotic, the body lost its heat *more rapidly* when artificial respiration was maintained, than by the gradual cooling process in a dead animal. Other phenomena of the nutritive processes being referred to, he says "there seems to be no reason why the evolution of heat should not be one of the results of the operation of the *nervous power*, as it is of electricity."

We would here refer to a case of our own in which a fatal injury had been sustained by the spinal cord near some of the upper cervical vertebræ. The respiration was very slow, as was also the circulation, but the heat of surface amounted almost to *calor mordax* during the whole time that the patient, a mulatto boy about twenty years of age, survived, which was more than a week.

From the above it is very evident that Sir Benjamin Brodie fully established *that the principal controlling influence of animal temperature is in the nervous system;* and it was rational to infer that inasmuch as the experiments were performed upon, and the injuries in the cases reported sustained by the *cerebro-spinal* centres, that *this* portion of the nervous system more or less directly presided over the thermal phenomena of the living body. But in the year 1851, M. Claude Bernard began a series of experiments on living animals by which it seems to be fully demonstrated that the control of this particular function, so to speak, is more directly under the influence of the *ganglionic* system.

"It appears that an elevation of temperature constantly takes place on the side of the face when the trunk which unites the sympathetic ganglia of the neck on that side is cut through; this

increase not only being perceptible to the touch, but showing itself by a thermometer introduced into the nostril or ears, even to the extent of from 7° to 11° Fahrenheit. When the superior cervical ganglion is removed the same effect is produced, but with yet greater intensity. This difference is maintained for many months and is not connected with the occurrence of inflammation, congestion, œdema, or any other pathological change in the part. Moreover, it is not prevented from manifesting itself by the division of any of the cerebro-spinal nerves of the face."[1] The fact that sections of the sympathetic nerve are sometimes attended with an elevation of temperature, was casually noticed even in those first experiments of Pourfour du Petit, to which we have so often referred; but this, there can be no doubt, belongs to that class of *observed and recorded*, though *unappreciated* facts, many of which are accumulating at the present time, which, though observed and noted, could never benefit the world in the least, unless reobserved and renoted in the light of a more advanced physiology. M. Claude Bernard has since pursued these experiments with a definite view to the one object of animal heat, varying them in every possible manner, so as to answer all objections to his deduction that, the elevation of temperature was an effect independent of the accompanying condition of congestion in the vascular system. As we have seen, Dr. Brown-Séquard[2] interpreted the phenomenon as the result of the increased congestion of the part from a paralysis of the vascular nerves. This Dr. Bernard[3] denies very positively, thus: "The whole region of the head which becomes overheated after the section of the nerve, becomes also the seat of a more active circulation. This is very distinctly seen in the vessels of the ear of the rabbit. But afterwards, and sometimes even on the very next day, that vascular turgescence is often much diminished, while the heat of the surface in that side continues to be much increased." To this we would add a suggestion which has a kindred bearing on our subject, viz., that, in all cases of morbid turgescence of the cutaneous surface as the stasis characterizing the cold stage of fever, and more especially that form known as "congestive" in common parlance, the temperature of the surface, so far from being elevated, is diminished to

[1] *Vide* Carpenter's Physiology, American edition, by Francis Gurney Smith, M. D. Philadelphia, 1853, p. 627.

[2] See page 566 of present essay.

[3] *Vide* Leçons sur la Physiologie et la Pathologie du Système Nerveux. Paris, 1858, tome ii. p. 493.

the lowest degree; the *coexisting coldness and congestion* being the two most alarming traits of the disease appreciable to common observation. It appears that simple *fulness* of blood in a part does not give rise to increased animal heat, but that the turgescence must be accompanied with those active chemical changes which by experiment[1] are known to take place during the existence of a high degree of fever heat. During the stasis of the chill, although there is evidently a large quantity of blood in the part, the chemical changes appear to be impeded, and animal heat is not evolved until the circulation becomes active again, in the full establishment of the fever.

From the above, it will at least be seen that, impressions made directly upon the ganglionic system are capable of modifying animal temperature. The manner in which this is done we do not think has been made sufficiently clear, until very recently, for us, in a treatise venturing to deal only with established facts to discuss. Many valuable facts have, however, been furnished by the investigations of our colleague, Dr. Joseph Jones, during the present year, which it will become our duty to consider in the application of our law to the more strictly chemical changes of cerebro-spinal or malarial fever. It is fully adequate to our purpose under the present head, to make manifest the fact, that the modifications of *animal temperature* do originate in the nervous system, and that the direct guidance of this function is ordinarily under the dominion of the ganglionic system.

As frequently happens in the history of inductive science, the *last* fact necessary to the full development of truth, is the *first* to be discovered and settled; still fortunately for us, in many instances, this single fact or principle serves well the purposes of legitimate reasoning, and practically, the value of the results is but little diminished; but when some other integral fact presents itself, should it be apparently contradictory to the first, for a time, science is, as it were, disconcerted, and either cleaves to the one or the other, or more properly, suspends her judgment in the search after some principle of connection which shall conciliate what can be only *apparently* adverse. We should never close our eyes to exceptional phenomena, but seek the truth boldly and earnestly, keeping them ever fully in our view; for, though for a time they may

[1] *Vide* Observations on Malarial Fever. By Joseph Jones, M. D. Southern Medical and Surgical Journal, vol. xiv.

apparently deny a general rule or well-established principle, they can never contradict nor disprove it; they do not *really* deny it, but only in appearance, as viewed in the, as yet, dim light of a but partially revealed and dawning science. In the course of time these same embarrassing exceptions become important and essential elements, without which the whole consistent truth could not ultimately have been attained.

That Sir Benjamin Brodie's experiments and observations are significant and valuable for all time, and that his deductions from them, viz., that the condition of the *cerebro-spinal* centres influences the temperature of living animals, are legitimate, indeed unavoidable, there cannot be the slightest doubt. This opinion has become the accepted doctrine since it was first proved and enunciated by him in 1811, and the control of all thermal vital phenomena are attributed to the *nervous system.* He having called attention in that direction, thousands of observations made at the bedside, in cases of accidental poisoning with agents known to depress the cerebro-spinal nervous system, as morphine and other narcotics, observations made in cases of cerebral and spinal concussion and compression; as well as in those of a more general character, as in the poisoned condition of the blood by the malarious and other poisons, as in some instances the scarlatinal, have all served to establish the fact, whatever may hereafter be proved to be the ultimate *mechanism* by which it is accomplished, that this influence of the cerebro-spinal nervous system must ever be an acknowledged, indeed an incontrovertible fact.

But since the reading of M. Claude Bernard's report to the Academy of Sciences, "sur l'influence du nerf grand sympathique sur la chaleur animale," on the 29th of March, 1852, a number of facts or data, of a different character, have been accumulating, which, by frequent repetition and verification, have come to be regarded, on a cursory examination, in the light of a partial negation of the significance of those of Sir Benjamin Brodie. This modification of their significance, however, will not, it is probable, become general, as Mons. Bernard's results are but so recently published in permanent form,[1] that their contradictory aspect must be changed and all of them made to become rather confirmatory.

A few years[2] previous to the reading of Mons. Claude Bernard's

[1] 1858. Leçons sur la Physiologie et la Pathologie du Système Nerveux.

[2] *Vide* Essay on the Influence of Dentition in producing Disease, 1850.

record on animal heat, the subject of reflex phenomena between the two nervous systems, the cerebro-spinal and ganglionic, began to fix the attention of the profession, and since then, much diligent investigation has been bestowed upon these reflex acts. In the establishment of the excito-secretory function of the nervous system, we think that the conciliating principle between these heretofore apparently adverse phenomena, is only to be found. We may now discuss the phenomena *upon a principle which is capable of grasping the entire facts*, whether they are presented in the observation of the effects of injuries, the effects of poisons, or as the results of experimental sections, made in either the ganglionic or the cerebro-spinal system. Whatever may be the *detail* of the causal relation between Sir Benjamin Brodie's observations and experiments, and M. Claude Bernard's investigations, made over forty years after, it is certain that, with our present knowledge of the capabilities of the nervous system, they each contain only *a part*, though a most important part, of the truth, and that there is a most significant *relation* between the two classes of facts. Although in the minds of some, there may be certain slight obscurities in the path of a perfectly clear induction on this point, the truth will be found in the statement that the calorific power resides more immediately in the ganglionic system, but that, like all the other functions of this system, it is under certain circumstances, amenable to the control of the cerebro-spinal.

Having thus furnished a sufficient number of observations and experiments which, taken with the many dependent analogies of every day observation, will fully convince us that the variations in animal temperature are, perhaps, the least inexplicable of all the phenomena presented during the paroxysm. Lest it might be asked how can a permanently existing condition of the cerebro-spinal centre give rise to both the *cold of the chill* and the *calor mordax of the fever*, we remind our readers of the case adduced by Sir Benjamin Brodie, and quoted by us but a few pages back: "A gentleman was seized with an *apoplectic fit;* he lay insensible in bed covered with blankets; his whole body became *extremely cold* in every part, and continued so for some time, and in a short time, it would become *extremely hot. This went on alternately for several hours.*"

The conduct of those chemical processes in the tissues, which we are led, more particularly since the recent analyses and observations

of Dr. Jones, to believe *immediately* underlie the production of animal heat, are according to our interpretation of the results of M. Claude Bernard's experiments, confided, like all such recondite processes, to the immediate superintendence of the secretory system of nerves, but Sir Benjamin Brodie's well-established facts, as we interpret them, prove, that the ganglionic system is in all these thermal phenomena *governed* by the cerebro-spinal system. The normal life of this cerebro-spinal system is periodical, and therefore when we would apply our law to the varying temperature of cerebro-spinal fevers, we find it, as heretofore, fully expressing the mode or manner in which the cause operates;[1] *In a system of bodies* (the ultimate materials, if we please) *acted upon by forces which are periodical, the state of that system must be periodical like the forces.*

THE LAW OF PERIODICAL EXCITO-SECRETORY ACTION APPLIED TO THE BLOOD-CHANGES AND CHEMICAL-CHANGES OF MALARIAL FEVER.

Chemical theories of disease have, from an early period, in one form or another, and presenting themselves under the most varied relations, found record upon the pages of medical history from the days of Paracelsus[2] and Van Helmont,[3] to the present time. This "chemical medicine," as it is called, at one time, proposing to account for the origin and to explain all the phenomena presented in the progress of disease, while at others it offers to cure all the ills of the human body, by combating with certain chemical reagents the *materies morbi* or abnormal elements of the blood, has passed through many phases. This charlatanry, as it may be called, for there was often but a modicum of earnest love of science mixed with a vast amount of pretension and ignorance, gradually disappeared as chemistry became an established science. As the hope of something *real* now presented itself, a more honest and laborious spirit was engendered, and each generation of these chemical pathologists, when their history is reviewed, is seen to be an improvement upon the preceding, till at the present day, systematic investigation has been fully inaugurated among the laborers in this fundamental department of physiology and pathology. Whatever may have been accomplished in this department *generally*, can have no particular connection with the interests of our paper.

[1] See note, page 634. [2] 1527. [3] 1577.

In the application of chemical analysis to the investigation of the blood and other fluids of the body, and particularly the secretions, as the urine, saliva, etc., in diseases, fever, ever the most prominent and interesting of the morbid conditions of the human body, has gained a certain share of attention. These investigations have, however, been but loosely, and, as is apparent in reviewing them, disadvantageously conducted even by chemists of the highest scientific ability in the other departments of analysis. They appear to have been pursued without any definite system, and in the end, have produced no very significant or useful result.

"We cannot at the present time," says Lehmann,[1] "attempt to decide whether the group of symptoms which accompany most acute diseases, and are designated as *fever*, are characterized by certain constant alterations in the relative quantities of the blood-constituents; but all investigations agree in showing that fever itself exerts neither an increasing nor decreasing action on the vacillating amount of fibrin in the blood. The inquiries hitherto made, do not warrant us in deciding whether the admixture of the blood which Becquerel and Rodier believe they have found to exist during the development of every acute disease, can be regarded as peculiar to fevers. According to these authors, the blood presents at this time the following appearances: It is in general somewhat more watery than in its normal state; the corpuscles are slightly diminished in number, while among the fats, the cholesterin and phosphorized fats are especially increased; the extractive matters and soluble salts occur in normal quantity, while the phosphates are considerably augmented.

"The same inquirers found that the blood-corpuscles, as well as the fibrin and the soluble salts of the serum, occurred in this normal quantity in simple *ephemeral* and *remittent fevers*, while the albumen was slightly diminished and the cholesterin increased.

"In slight intermittent fevers, Zimmerman found that the fibrin was only increased in a few cases, being more frequently diminished, but it in general occurred in the normal quantity. Its increase appeared to stand in a direct relation to the *duration* of the fever. Becquerel and Rodier found the fibrin diminished in most cases of intermittent fever.

"In *marsh-fevers* (*malaria*), the corpuscles are considerably increased (Salvagnoli and Gozzi, Luderer), while the fibrin, albumen

[1] Physiological Chemistry, vol. i. p. 633.

and fats are proportionably diminished. A large quantity of cholesterin as well as of bile-pigment is in general found."

We make here one other quotation from this author, to show the amount of definite knowledge which has been so far attained by these researches, and then our selections will be from the more recent investigations of Dr. Jones.

Without giving his readers any idea of the character of the fever indicated, we find the following general remarks in Lehmann's work, vol. ii. p. 170, relating to the urine:—

"Febrile urine," says this author, "is generally more deeply colored than usual (being of a red or reddish tint), has a stronger odor, a higher specific gravity, and a more decided reaction. As long as the fever continues, less than the normal quantity of urine is generally secreted by the kidneys, and the urine appears concentrated, because the diminution of the water of febrile urine is relatively more considerable than the diminution of the solid constituents. The constant characters of such urine are the relative and absolute diminution of the inorganic salts and the obvious augmentation of the uric acid, or urates. The diminution of the salts was always observed by Becquerel and Simon; it was the latter chemist who first discovered that the loss principally fell on the chloride of sodium. Even when febrile urine does not deposit the ordinary sediment of urate of soda, it is always absolutely and relatively richer in uric acid than other urine. The urea is generally somewhat diminished, as Becquerel first demonstrated; Simon holding the opposite view. The extractive matters are usually somewhat increased. Lactic acid may very often be detected with chemical certainty in urine of this nature."

During the present year, our colleague, Dr. Joseph Jones, professor of chemistry in the Medical College of Georgia, has been engaged in the publication of the results of his observations and analyses of a very large number of cases[1] of malarial fever, and his processes have been conducted with a greater amount of care and precision than those of any observer within our knowledge. Every one of the phenomena of each case is particularly noted and presented along with the analysis, and the entire body of his examinations is conducted in such a manner as to lead us to the opinion

[1] "These observations were conducted in the Savannah Marine Hospital and Poorhouse, and over two hundred and fifty patients, suffering with the different forms of malarial fever, came under my observation." Page 12.

that they are about to inaugurate a new era in the science of investigation in this particular department of pathology. These investigations refer more particularly to the conditions of the blood, and to the changes which occur in the urine, and to the variations in animal temperature. The report of his operations is so elaborate, that under a single head of a compendious essay like the present, we can afford space for but a very short statement of the results.

"In the present state of medical science, the complete investigation of all the effects and phenomena of disease is impossible.

"Imperfections in our instruments; imperfections in our methods of analysis, and the complicated nature of the phenomena, render physiological and pathological investigations difficult and uncertain.

"In pathological investigations, we need in this country, above all things, an organized corps, who would make a division of labor. We should have a separate investigator for the careful examination of each one of the following subjects:—

"The analysis of the urine (1); blood (2); determination of animal temperature (3); functions of skin and lungs (4); record of symptoms and treatment (5); meteorologic, geologic, and topographical investigations, and record of mortuary statistics (6); examinations chemically and microscopically of the structure and alterations in the nervous system after death (7); and of the liver and bile (8); of the alimentary canal with its secretions and excretions (9); and of the kidneys and the other organs (10).

"If a corps of intelligent, generous-minded observers would act with zeal and unity, the results for medicine would be of the most momentous character. It would, in time, rank amongst the exact sciences, and the physician would become a true prophet; and instead of the frequent disagreement between theory and practice, and between rival schools, we would have harmony; instead of distrust in the public, and even in the minds of physicians themselves, we would have confidence."

In accordance with the plan above laid down, Dr. Jones proceeds to make his investigations. We here present a few of the conclusions with regard to the changes in the temperature of the blood and the urine. It sufficiently answering our purpose to show that great changes *do take place* in these respects, we will not dwell upon *what amount* of the element voided as shown by each analysis, as these points do not present any particular interest to the process of reasoning we wish to institute.

"We hope to demonstrate hereafter, by numerous careful ob-

servations, that the determination of the relations of the circulation, respiration, and temperature or chemical changes in malarial fever, is of the greatest importance in enabling the practitioner of medicine to understand the nature and treatment of the different forms of this disease, and predict with a great degree of certainty its course and termination. Whenever, as in congestive fever, there is a want of correspondence between the circulation, respiration, and chemical changes, the patient is always in danger. A patient with a rapid, feeble pulse, and rapid thoracic respiration and low temperature (sluggish chemical changes), is always in great danger. A full, rapid pulse, and rapid thoracic respiration, and correspondingly high temperature, are always favorable symptoms, provided there be no complication, as congestion of the brain. The severity of malarial fever is by no means proportional to the height of the fever (animal temperature). As a general rule, the higher the fever (temperature), the more readily does the attack yield to treatment, and the less serious the effects. *High temperature signifies active chemical changes, and an effort on the part of nature to break up and consume the poison, and a power of resistance.*

"It is the want of a high temperature which is the most dangerous symptom in malarial fever."

A comparison between the urine of the fever, and the urine of the convalescence is here instituted:—

"From the microscopical and chemical examination of several hundred specimens of urine excreted during the different forms of malarial fever, I found it, as a general rule, to be true, that in the mode of treatment which I adopted, the uric acid appears in much larger quantities in the urine of convalescence, than in that excreted during the fever, even when the sulphate of quinia had been withheld, or sparingly administered. The majority of specimens of urine excreted during fever, which were set aside and examined, under the microscope, at successive intervals, gave no deposits of the crystals or salts of uric acid, whilst specimens of the urine of convalescence very soon gave evidence of the presence of uric acid, by letting fall deposits of urate of soda and ammonia.

"These facts explain the nature of the so-called critical discharges of malarial fever. The urine excreted during fever is generally deficient in uric-acid and the earthy salts, whilst its acidity is increased, and it will remain for a great length of time without undergoing decomposition.

"The urine of convalescence, on the other hand, is rich in uric acid

and the earthy and alkaline salts, and readily undergoes decomposition. The deposit of the urates of soda and ammonia, and the precipitation of the triple phosphate, by the ammonia generated during decomposition of the urea, form the so called critical discharges.

"As a general rule, the urine excreted during the hot stage of intermittent fever, is poorer in uric acid than the urine of remittent fever, and I have known cases in which, during fever, the uric acid disappeared almost entirely.

"In several cases of congestive fever, the urine contained only traces of uric acid, and in one case, which terminated fatally, the disappearance of the uric acid was attended with the disappearance of the urea."

In the above brief quotations, we find ample testimony to the fact, that very active chemical changes take place during a paroxysm of cerebro-spinal fever. As the result of this vigorous chemical action of the paroxysm, we have those abundant eliminations of the urates of soda and ammonia, constituting prominent elements in the abundant discharges observed for a very long time in the stages of fever-convalescence, and so well known under the common name of "critical discharges."

The phenomena presented by the chemical analysis of the urine, together with the other remarkable changes in the fluids of the body in paroxysmal fever, have been for a long time the subject of much speculation with pathologists as to whether they should be viewed as the *results* or the *cause* of that essential condition upon which the fever depends, and that division of medical opinion, upon which is founded those two prominent sects of pathologists, the chemists and the neuropathists has mainly arisen, in the discussion of questions of exactly this nature. While we have repeatedly expressed the opinion in the earlier parts of this paper, that it is *through the blood* that the external causes of paroxysmal fever reach and operate upon the cerebro-spinal nerves and centres, we will here definitely state that a careful consideration of all the phenomena impress us strongly that *these* changes in the constituents of the urine are the *results* of the paroxysm, for they are manifested only during and immediately after it, and in all probability have nothing to do with the production of the essential phenomena of that state. The same remark we here make with regard to the alteration in the constitution of the red blood-corpuscles noticed on a former page. We have every reason to believe that these are also the *results* of the paroxysm.

Intimately connected with these chemical changes so manifest in the active stage of malarial fever, we find, according to the very accurate observations of Dr. Jones, is the simultaneous development of an exalted animal temperature, constituting the *fever heat*, and which we have every reason to believe is their direct result. But the function of animal temperature, so to speak, we have clearly had demonstrated to us, is one of the results of the action of the ganglionic system; this we also fully admit, in accordance with the principle upon which we have endeavored to conduct this whole discussion, viz., *that of denying no well-established fact*, either of experiment or observation; but it must be remembered that all chemical changes taking place in the living tissues, occur so fully under the guidance and superintendence of the ganglionic system, as do the more common and notable acts of circulation and secretion, and therefore it may legitimately be inferred *that the animal heat is only a result of that play of chemical affinities which takes place in the intimate structure of the tissues under the necessary and immediate guidance of the ganglionic system of nerves.*

Of whatever nature, then, these chemical changes of paroxysmal fever may be—let them be the result of a simple interchange of elements, or so to speak, of a true *interstitial combustion*, the salts of the urine in convalescence being the residuum, the true *ashes* of the consumed tissues—we must recognize the fact that they take place under the nervous influence of the ganglionic system which we have repeatedly shown, is in malarial fever, governed by the cerebro-spinal "whose healthy life is periodical."

The chemical changes and most of the blood-changes, then, of malarial fever, like the elevated temperature, which is their immediate result, are no longer mysterious on account of their periodicity, for this is the manner in which, and *only* in which, we could expect them to occur; for, according to the law so often applied—*in a system of bodies acted upon by forces which are periodical, the state of that system must be periodical like the forces.*

It has thus been seen that, in the application of the law of periodical excito-secretory action to the various classes of phenomena of paroxysmal fever, each one is but a special expression of that law; and so strictly is each phenomenon of fever found to conform to it, that what we have said on the first enunciation of it, will now be admitted as strikingly true, viz: *That cerebro-spinal fever, in its elemental and intrinsic nature, is essentially but a vast exhibition of this law of periodical excito-secretory action.* So fully does this obtain,

that, like in the anatomy of the human brain, the *developments* from the fundamental ganglia, for a long time, obscured the ganglia themselves, which constitute their essential nucleus, from the understanding of the anatomist, so in these fevers, have these secondary outgrowths, masked and enshrouded until now, that which is really the fundamental basis of the disease; "that, without which," in the words of Maillot, "it would have no foundation for its superstructure," viz., the original cerebro-spinal affection. It is true that, in the chill, and in certain aberrant forms herein cited, as the cases of convulsions, excito-motory action is plainly indicated, but the real and uniform characteristic tendency of the system, under the influence of cerebro-spinal fever, is to the periodical excito-secretory action. It is this which causes them to *stand out, a class apart*, from all the other neuroses, whether cerebro-spinal, or ganglionic, as par excellence, *the excito-secretory disease;* for, in no condition of the human organism is this function so universally, and on so grand a scale exhibited, as when it has its culmination in these paroxysms. Every organ, every function, every tissue, each corpuscle, atom, and granule, lends its aid to make up the minuter details of the great, complicated drama of excito-secretion, which is enacted throughout the whole system, during a paroxysm of malarial fever.

CEREBRO-SPINAL FEVERS OF A SINGLE PAROXYSM.—YELLOW FEVER—DENGUE FEVER.

I. YELLOW FEVER.—It will be observed that, during our examination of the subject of paroxysmal fever, we have heretofore pursued the plan of stating the general characters of these forms of fever without attempting to describe, with minuteness, the peculiar characteristics of each particular type of this well known affection. We have been led to adopt this course heretofore, because of the great familiarity which our readers everywhere, must possess, with all the ordinary forms of paroxysmal fever. The main object of this paper being, however, to give *a basis* upon which, hereafter, we wish to establish a classification which shall be capable of comprising *every variety of fever*, it becomes necessary for us to consider, with somewhat of special care, any form which, in its general presentation of phenomena, may appear to contradict our principles, or at first, seem refractory to the lines by which we seek to bound the entire class of febrile diseases. Such a disease is YELLOW

FEVER—a disease which, perhaps more than any other febrile affection, has for the last fifty or sixty years excited more alarm, received more of the attention of our profession, and presents a more comprehensive literature, than any one form which has been subjected to discussion during that entire period.

To many, who have had the patience to follow us through the entire course of our examination, it will perhaps be surprising that, in the doubt and uncertainty which at first, must appear to embarrass such a decision, we have determined to place yellow fever among the cerebro-spinal forms, notwithstanding that its most distinctive phenomena appear to be those which indicate aberration, if not *primarily*, at least *principally*, in the ganglionic system. This difficulty has, from the first, presented itself to our own mind, in its full force; and upon further consideration, it must be admitted to obtain, in a certain degree, with regard to every form of febrile disease which we have yet examined; but in considering the phenomena of any one type, we cannot always locate it where, on a casual examination, we could most *plausibly* place it, and where our decision would be least challenged or disputed. It is our desire to give yellow fever that position in our classification, in which, it will be most likely *to remain*, when after years of more diligent investigation, than it has even yet received, it shall have come to be thoroughly understood, not only in its phenomenal representations, but even in the very laws, now beyond our apprehension, underlying the occult nature of these observed facts. We are endeavoring to classify fevers by the nervous system, which we believe to be the only true basis of their arrangement, and as truth is the ultimate end of our labor, we shall not complain if our classification shall hereafter be improved by the transfer of this one form of disease, from one of our own principal divisions to the other.

On entering upon the consideration of yellow fever, we again remind the reader of the necessarily *compendious character* of this paper, and state that, in our present outline, we shall attempt only, a condensation of the more prominent and strictly characteristic features of this interesting form of disease. In making up this résumé, our chief indebtedness, we acknowledge, is to the excellent and comprehensive treatise of Dr. R. La Roche, of Philadelphia,[1]

[1] Yellow Fever, considered in its Historical, Pathological, Etiological, and Therapeutical Relations; including a Sketch of the Disease as it has occurred in Phila-

a work to which we should look with much pride and satisfaction, for in it, is demonstrated the fact that we are the best historians of those diseases, which, though prevailing often elsewhere, may be said, so far as the amplest opportunities afforded for scientific observation, to be more particularly American.[1]

To any one at all familiar with the subject, either practically or by its literature, the expression of much diffidence in fixing upon the *pathology* of yellow fever will not excite the least surprise. The very history of the science of classification affords too many instances of *transfer*, after the most confident location of its various members in their adjudged positions, for us to hope that here, our decision is necessarily immutable; and when natural history, dealing with its far more tangible and appreciable subjects, is liable to error, we cannot expect to be infallible when we would attempt, however carefully, to bring order and simplicity out of such confusion and complexity as are admitted everywhere, to be presented in the phenomena of febrile diseases. When we admit that more extended observation may transfer yellow fever from the nosological position in which we have placed it, we do not, however, consider ourself as by any means yielding the same, with regard to the other cerebro-spinal fevers, among which we think, for good and sufficient reasons, we have classed it. Malarial fever, in its various forms, though arising from a *cause* which, in its ultimate nature, is, as we have seen, no better understood than that of yellow fever, has in its phenomena, that clear and pointed reference to the cerebro-spinal system, which admits of our there locating its primary *dynamic* influence, on the principles of the strictest and most legitimate induction; but yellow fever, owing its manifestations to a peculiar specific poison, not only equally unknown, but far less familiar to us, must for a long time to come, present much difficulty, whenever the attempt is made to discriminate between the one or the other order of its symptoms, with the view to its ultimate classification. While we would not attempt to deny any of these difficulties, we yet, after much deliberation upon the subject in its various relations to other allied diseases, in which the cerebro-spinal phenomena are admitted to be undoubtedly predominant, will endeavor to develop its probable nearer affinity to the cerebro-

delphia from 1699 to 1854. With an Examination of the Connections between it and the Fevers known under the same name in other parts of Temperate as well as in Tropical Regions. In two volumes. Philadelphia, 1855.

[1] Febris flava Americana, Pinel.

spinal, than to the ganglionic fevers. Let us, however, before discussing these, examine briefly a few of its intrinsic phenomena, as observed by ourself, and as found recorded by some of the best observers.

Yellow fever, like the malarial, and indeed every other form of fever, whether cerebro-spinal or ganglionic, has, for its ultimate cause, the existence of a peculiar morbific agent introduced into the *blood;* and through that all-pervading medium of the living organism, it reaches the nerves and nervous centres, moving them to the manifestation of the observed phenomena, ever in strict conformity with the normal habitudes of these nervous centres, and of the organs which they supply. This toxic condition of the blood, we hold to be *prior* to the peculiar manifestations of the attack, and should be ever kept *distinct* from those remarkable changes in the elements and constitution of this important fluid, which occur as the *consequences* of the paroxysm, and which continue to increase and to deepen, as do the changes in all the tissues and fluids and secretions of the body, with the returns of the paroxysm, in cerebro-spinal fever, and with the continuance of the disease in the ganglionic forms.

The first is probably in each case the *cause* of the attack, while the second are the *results* of it, under the chemical changes during the presence of the poison, and under its influence through the nervous system.

The condition of the blood has been most accurately noted in every stage of yellow fever, and so abundant are the reports of these various observations, that a mere summary of them, in this place, would occupy more space than the restricted nature of this paper allows us to devote to the whole subject of yellow fever. Suffice it to say, that these changes have been observed under every relative circumstance of the constitution; from the blood of the apparently healthy subject living in the infected atmosphere, to the blood of the dying or recently dead, with this terrible disease. "The changes," says Dr. La Roche, "to which attention has been called, as occurring in the blood of the yellow fever of both temperate and tropical regions, modified though they may be, under different epidemic influences, sometimes in different individuals during the same season and in the several stages of each particular case, evince the production in that fluid of a marked condition resulting from the introduction therein of a *febrific poisonous agent.*[1]

[1] The Italics are ours.

They are, in no small degree, analogous to those produced by the action of other such poisons, as well as of numberless toxical substances of the animal, vegetable, and even mineral kind, and also of putrid substances introduced into the circulation." The diminution of the fibrin and increase of corpuscles, and also the diversified proportions of saline ingredients and the almost constant dark color of the blood are observed in other diseases remotely allied to yellow fever, as well as the absence of any notable or perceptible changes of that fluid in some cases or stages of that fever, clearly proves, he thinks, that we cannot refer solely to that particular condition of the blood, all the symptoms of the disease in question. Something else is required for that purpose. "All, so far as we know, is that the specific cause of the fever acts upon the blood in such a way as to destroy its coagulable element. We may apply to the disease before us, what M. Andral says of the pyrexia generally. 'If the cause acts with little energy, or if the economy resists it, the destruction of the fibrin is not effected. If, on the contrary, the cause continues to act with all its intensity, and the power of the organism fails, the destruction of the fibrin will commence either from the onset of the attack, which is rare, or some time after. This applies as well to typhoid as to eruptive fevers. In these cases there exists *a true intoxication.* If it is slight, its effect on the blood doubtless is produced in all cases, but it is not appreciable to our senses; but if the intoxication is more considerable, the effect it produces on the blood becomes perceptible, and is evinced by a diminution of the fibrin.'[1]

"At what period of the disease," continues our author, "the changes adverted to commence, it is difficult to say positively. We have seen that, in many cases, they are not perceived in the early stages—the blood retaining its apparently natural aspect—and only become well marked at an advanced period. At the same time, it is difficult to resist the belief that, whatever may be the outward appearance of the fluid, however natural it may seem to us, *it is early morbidly acted upon by poison;*[2] and thus undergoes from the outset, changes which, though escaping our means of investigation, are not on that account the less real. On this subject I cannot but coincide with a writer who is entitled to regard in all matters connected with the disease. 'It is probable,' says Dr. Evans, that 'the

[1] Essai d'Hématologie Pathologique, p. 68.

[2] Italics are ours.

day will arrive when the blood, in all these cases, will be proved to have undergone a particular modification, which our present ignorance prevents us from detecting. It is difficult to understand how, in two cases apparently similar, and arising from the same cause, one shall exhibit a change in the constitution of the blood, and the other not. Is it not more rational to suppose that in both, this change exists, but in different degrees, and that we detect it in the one, only because it is evident to the senses?'

"The correctness of the above opinion will appear the more probable when we bear in mind the well known fact that the poison of the fever, floating in the atmosphere during the course of an epidemic, produces an impress on the blood of most—probably of all individuals within the range of its influence, without however, necessarily affecting them sensibly or impairing their health. On this subject, the facts recorded by several American and other writers leave no doubt. Alluding to the fever of Baltimore in 1800, Dr. Potter says: 'To ascertain the appearance of the blood in good health, I drew it from five persons who had lived the whole season in the infected parts of the city, who were, in every external appearance and inward feeling, in perfect health. The appearance of the blood could not be distinguished from that of those who labored under the most inveterate grades of the disease. A young gentleman having returned from the western part of Pennsylvania, on the 10th of September, in good health, I drew a few ounces of blood from a vein on that day; it discovered no deviation from that of other healthy persons. He remained in my family till the 26th of the month, and on that day I repeated the bloodletting. The serum had assumed a deep yellow hue and a copious precipitate of red globules had fallen to the bottom of the receiving vessel.'[1] Dr. Archer, of Norfolk, has also noticed the same fact, stating as an evidence of the extent to which the predisposing causes of this fever operated, that the blood taken from healthy persons generally exhibited changes which were easily discernible as it trickled down the sides of the basin. 'These were pretty regularly increased as you approached the infected district.'[2]

"In this respect the poison of yellow fever," continues our author, "approximates to that of other fevers and of zymotic diseases generally." He then refers to a number of observations made in different parts of the world, to show that the changes in the blood, as a com-

[1] Memoir on Contagion, p. 54.

[2] History of Yellow Fever of Norfolk, in 1821, Med. Rev., v. 68.

mon thing, is proved to have taken place whenever this fluid is examined in persons residing in the affected localities, *before any external indications of the disease.* Dr. John Mitchell found that during an epidemic fever in Virginia, that the blood of apparently healthy persons had a "thin and dissolved" consistence, and he says, "this was the constant state of the blood in about thirty or forty whom I have known to have been bled, at all seasons of the year."[1] Salvagnoli, to whom we have before referred, in speaking of the fevers of the Tuscan Maremme, says: "So great and so constant is the difference, that, from the physical examination of the blood only, almost without error, the physician may judge if the patient resides constantly in an unhealthy atmosphere, and if the liver and spleen have been altered." Dr. Stevens' statements with regard to the malarial fever of the interior of New York, fully coincide with the above. "Whilst," says he, "even in those who reside in the most unhealthy situations and who have not yet had fever, the blood is not only dark in color, but was evidently so much diseased in its properties as to be very unlike the blood in health." He also noticed the same changes during the prevalence of malarial fevers in the West Indies; and to every practitioner in malarious districts, the observation is of daily familiarity, that the puffy and œdematous appearance of the inhabitants, is not always necessarily the *consequence* of an actual attack of intermittent or remittent fever, but seems to be fairly attributable to a previous general deepening intoxication of the blood, which produces its pernicious effects upon the tissues of the body, in a very notable degree, sometimes long before the *nervous system*, their dynamic source, is moved to the manifestation and guidance of those phenomena which constitute *paroxysms* of fever; and in which, it then appears as the all-controlling and directing influence.

Here, perhaps, we may best answer that objection to the influence of the nervous system in febrile diseases, which says: How can we attribute the phenomena of paroxysmal fever to the cerebro-spinal system, when often, the first manifestations are such as refer to the secretory system, as the foul tongue and other evidences of deranged secretions observed previous to the actual attack?[2] Did

[1] Med. and Philosophical Register, iv. 188.

[2] See the impartial review of our previous communication to this Association found in the Nashville Journal of Medicine and Surgery, by the able Senior editor W. K. Bowling, M. D., Professor of Principles and Practice of Medicine in the University of Nashville, Tennessee.

we not admit fully, the influence of a *malarial toxæmia*, we must say, that it would be difficult to answer objections of this kind, in a manner fully consonant with our neuro-pathic views of fever; but when this is admitted, as a prominent and fundamental element of our creed, there can be no trouble in answering such objections; for all will admit that vitiated blood will give rise to vitiated secretions, even without any appreciable or material aberration of nervous action. We may then say that, under these circumstances, the nervous system has not yet been moved to that serious amount of aberration, which marks the peculiar phenomena of fever, but that while the secretions are still eliminated under the reign of a comparatively healthy nervous action, they are still early vitiated, *simply because they are drawn from a vitiated source, viz: the malarious or otherwise* POISONED BLOOD. Now, although it is plainly admitted that secretions prepared from vitiated blood must necessarily be more or less vitiated, still in fevers, and especially in the malarial types, the vast amount of secretory derangement, and particularly the mode of its presentation by which it characterizes fever, too plainly points to the *nervous system* as a *dynamic source* for the fact to be denied, and this aberrated nervous action, as we have repeatedly said, does control and direct the circulatory and secretory manifestations; and by its influence continues more profoundly to change the elements and constitution of the blood during the progress of the disease. It must be recollected that our motto is written on no "*one* side of the pyramid," but is continued *all around*, covering with one consistent and harmonious scroll, the humoral and the chemical, as well as the neuro-pathic side, each of which have been heretofore "vicious in their pretensions, because they have each in times past, claimed to possess in themselves, that entire truth which is only found distributed among them all."[1]

If it is admitted that a primitive alteration or intoxication of the blood is the initiative and fundamental cause of yellow fever, as of *all* fever, why, it may be asked, should we not endeavor to investigate these *conditions of the blood*, and find out the nature and the varieties of poisons therein intromitted, and classify fevers in accordance with the obtained results? This we do most earnestly advocate, and this we hope will one day be the basis of classification, which is to displace our basis; but is fever to remain improperly classified, and yellow and dengue fever to have no classifica-

[1] See title page of this Essay.

tion at all, while this desideratum is being attained? This has been the oft-reiterated proposition for nearly two thousand years, and yet what do we know with sufficient certainty, to dare to enter into this sort of a classification?—poor speed has it made, when even now, the indications from this source cannot establish, with any reliability or invariableness, the distinguishing traits of any one disease. We say, then, to this class of pathologists, go on and perfect the science in this department; *till then, the nervous system, and its recognized phenomena, constitute the most reliable basis of classification for febrile diseases.*

The following passage from Dr. La Roche's work, so fully sums up our attainments in this field, and, at the same time, reveals so clearly their inadequacy for any conclusion, beyond a dubious surmise, that we take the liberty of here using it, to give expression to our own views upon the subject. "As to the intimate nature of those changes, we know but little. We do know, however, that the lessened power of coagulability, and the dark coloration of the blood, are combined with, or are ascribable to, a deficiency of animal matter, or a derangement in its elementary principles, as well as to an accumulation of organic acids; and that, to an increase of saline matter may be referred the floridness of the blood in the early stage of some forms of the disease. We know, also, that the yellow or red color of the serum is owing partly to the coloring matter of the bile, and partly to dissolved hæmato-globulin; and that the peculiar swell is probably produced by the evolution of a volatile salt of ammonia, as conjectured by very competent authorities, is also very true. But, how the poison of yellow fever produces those effects, and whether, when it has done so, it remains in the circulation until eliminated through some of the emunctories, or enters into a peculiar chemical combination with the blood, are points which must be deferred for future inquiry. All that need be said in this place is, that, as in other fevers of a *kindred, though not identical*[1] character—the remittent of the African coast, and malarial fevers generally[2]—as, also, in typhus, typhoid, and relapsing fevers, in cholera asphyxia, in eruptive diseases, in the morbid states produced by certain vegetable and animal poisons, the blood presents phenomena not very dissimilar to those noticed

[1] Italics are ours.

[2] Bryson, Ed. Journ., lxix. 136; McWilliams, p. 148.

in the yellow fever; and as, nevertheless, each of the diseases mentioned presents symptoms which impart to it a character of individuality that enables us to distinguish it from the others, we may infer that those changes are of a secondary nature, or that the poison which produces the effects in question, floats in the blood, and occasions, through its means, those modifications on the tissues which constitute the disease under consideration; for it is impossible to suppose that the blood—though presenting appearances externally analogous in those diseases—can be really similarly constituted, and yet occasion morbid states so specifically different."[1]

Since it is seen, then, that with our present means and appliances for chemical analysis, we cannot expect to determine such marked and peculiar characteristics in the blood, as will enable us to classify yellow fever, or, indeed, any other fever, by it, it is therefore only by such of its incidents as are presented through the nervous system under the influence of its peculiar toxæmia, that we can, at present, hope to arrange the confused phenomenal representations of yellow fever, and to place the disease itself under its appropriate nosological head. Let us, then, study the disease in its clearly seen phenomena, and seek by a comparison of these, with similar facts of other diseases, those analogies and affinities by which we may venture to class yellow fever, in the sense we have explained, as primarily, *a cerebro-spinal affection.*

By a vastly preponderating weight of authority, yellow fever is established to be, in its intimate nature, the same disease, whether it prevails in temperate or tropical climates. Of Dr. Rouchoux, the most zealous, best informed and pertinacious defender of the opinion that there is a difference in the nature of the disease in different climates, Dr. La Roche says: "But if, with a full knowledge of what has been written on the fever of temperate regions, not by Mr. Rouchoux alone, but by our own writers and others in Europe, we open the principal works on tropical yellow fever, we shall find that matters present a very different aspect. Consult the volumes of Pouppé-Desportes, Warren, Chisholm, Jackson, Clark, Daviste, Savarési, Imray, and many others, and it will be plain to the commonest understanding that, in assuming the form of fever which he had occasion to see at Guadaloupe during a single epi-

[1] Op. citat., vol. i. p. 177.

demic, as the true and constant type of the disease, Dr. Rouchoux has been guilty of a great oversight, inasmuch as, during some seasons, and under peculiar circumstances, the fever of those regions presents an aggregate of phenomena, a diathesis, and a mode of progression, identical with, or closely allied to, those observed in the fever which he represents as belonging exclusively to regions beyond the tropics. So true is this, that the description of several West Indian epidemics on record—the memorable fever of Grenada in 1793, as described by Chisholm and Steward; that of Dominica, in the same year, by Clark; the description of several of the varieties noted by Jackson, Ralph, Imray, Savarési, Lemprière, not to mention others of as easy access, might, with very trifling changes, serve more appropriately for the epidemic of Barcelona, in 1821, of Cadiz, in 1800, and some of those of our own cities, than for the disease which is stated by Dr. Rouchoux to prevail exclusively in the Antilles. Dr. Jackson, who, after investigating the fever in the West Indies, during some thirty years, and describing its various modifications minutely and with consummate ability, witnessed the epidemics of Cadiz and Xeres in 1820, found, as has already been stated, that the diseases in those cities presented the characters he had noticed on various occasions in America, and entertained, in consequence, no doubt of their identity; and from all we have seen of our own fever, it may safely be affirmed that the same conclusion will be drawn by those who, while familiar from personal observations with the various modifications it presents at different times, will take the trouble to investigate the disease as it shows itself within the tropics."[1]

The premonitory symptoms of yellow fever are not found to differ very materially from those of malarial fever; loss of appetite, nausea, malaise, headache, vertigo, faintness, weariness, pain in the loins and legs, yellow tinge of the tongue, bitter taste in the mouth, thirst and costiveness, or diarrhœa. The attack may either present the above premonitory, or it may, like malarial fever often does, show itself suddenly. The mode of invasion, as very generally agreed upon by writers, from the time of Dr. Rush to the present, is, by either a chill or a chilly sensation. "Many went to bed," says Dr. Rush, "in good health, and awoke in the night with a chilly fit. Others were attacked in the day, and, in most of them,

[1] Pp. 144, 145.

the disease came on with a chill, which afforded, by its violence or duration, a tolerable presage of the issue of the case." Dr. Nassy also describes the same epidemic of 1793, and says that "the disease began with pains in the loins and head, accompanied with chills, more or less considerable." In 1820, Dr. Jackson says: "Chills, with few exceptions, occurred at the beginning of the attack, and were frequently distinct rigors; but sometimes amounted to only a sensation of coldness, or a crawling sensation." Those who report the epidemics in the West Indies and other tropical regions, are very generally agreed that in the beginning of the attack "there is uneasiness with languor, followed by a sensation of chilliness or cold shivering, which are soon succeeded by great heat."

The condition of the circulation during the paroxysm of yellow fever has been accurately noted and carefully described by a variety of authors. The pulse, from their account, as might be expected, considering the truly zymotic nature of the disease, presents but little uniformity either in its character, strength, or frequency. It is described mostly as hard, full, strong and regular, but then other equally good authorities affirm that it is soft and feeble, depressed and small, and, at other times, natural. "These conditions," remarks Dr. La Roche, "especially the last, indicate imperfect or deficient reaction, and are generally characteristic of the congestive or malignant variety of the disease."

According to our own observation of the epidemic in Augusta, in the year 1854, and it was a similar remark of the epidemic of 1839, the attack was preceded generally by extreme lassitude, stretching, pain in the loins and lower extremities, followed by either a decided chill or chilly sensations. The character of the succeeding fever was, ordinarily, of the sthenic kind—a full, open, bounding pulse, which was, most frequently, rapid; but during the epidemic of 1854, many cases were observed in which the pulse, unless critically examined, either in its rhythm or frequency, did not appear to differ very materially from that of perfect health, and yet these very cases, by all their other symptoms, presented, as M. Andral has significantly expressed it, the deepest "intoxication," with the peculiar poison of yellow fever; and dying, developed the most intense type of the disease.

"The conclusion to be drawn," says Dr. La Roche, "from the peculiar condition of the pulse is, that the *yellow fever*[1] *is not a dis-*

[1] The Italics are ours.

case in which the arterial system is necessarily implicated; since the most alarming symptoms, and even death, ensue when the pulse throughout remains unaltered or but little changed from the standard of health. We infer from this, that the cause of the disease is of a toxical nature, for a like unalteration of the pulse is noticed in other morbid states resulting from the deadly operation of kindred agencies; while the retardation of the pulse is evidently the effect of an altered condition of the blood, resulting from the action on the latter of the poison in question."

An attempt to describe the progress of yellow fever would bring under review such a variety of phenomena, each one of which would be entitled to a fuller discussion than the length of this paper will admit of, we refer the reader therefore to the comprehensive treatise of Dr. La Roche, for that full account of the disease which we confidently believe will only the more fully establish the views we here indite. "Any general description," says this author, "which would embrace all the phenomena observed under diversified circumstances, would, if alone trusted to, owing to the accumulation of opposite and conflicting details, afford but a slender chance of presenting to the mind a clear and correct picture recognizable at the bedside of the patient." Suffice it to say, that the disease has been found to vary so much in many of its characteristics in different cases, that the classification made by Dr. Rush and Dr. Samuel Jackson in 1793 and 1797, would scarcely be strongly dissented from in the grouping of cases at the present day, or in any of the epidemics occurring anywhere since that time. 1. Cases in which death occurred in four-and-twenty hours, with convulsions, coma, or apoplexy. 2. Open cases, with full tense pulse from the beginning to the end, severe pains, &c. 3. Depressed or locked cases, with debility, little or no pain, a depressed and slow pulse, a cool skin, cold hands and feet, and obstructed excretions. 4. Divided or mixed cases, with active pulse until the fourth day, when it became depressed, accompanied with all the other symptoms of the locked state. 5. Cases in which the pulse imparted the perception like that of a soft and shattered quill, accompanied with a disposition to sweat. 6. Walking cases, in which the patients were flushed or pale, had a full or tense pulse, no pain, good appetite, and walked about their rooms or houses as if little indisposed, until a day or two, or a few hours before death. 7. Intermittent cases. 8. Mild remittent cases. 9. Mild cases, in which patients continued to

attend to their usual avocations. 10. Yellow or jaundice cases with slight indisposition. 11. Chronic cases.[1]

Whatever may be the different classes under which cases of the disease may be grouped, the majority of writers concur in the opinion, that observed in its typal cases, yellow fever is essentially a fever characterized by *a single paroxysm*, varying in duration generally, from twelve to seventy-two hours, and that in proportion to the mildness or violence of that *one paroxysm*, is to be augured the seriousness of those organic changes, upon which the favorable or fatal results will depend. So uniform is the historical testimony to the fact, and so invariably has our own observation substantiated its unerring truth, that we have deemed this feature sufficiently characteristic and distinctive of both yellow fever and dengue, to bind the two together *generically*, under a common head, in our nosological arrangement. There may be other epidemic forms of fever less familiar to us, which may hereafter be properly classed by this trait of *single paroxysm*, under the same department, but only in these two, at present, does our personal experience bear us out in the arrangement.

We have just said that during this single paroxysm of yellow fever those organic changes are produced upon which depend the result of the case; the liver, the spleen, the intestines, but especially the *stomach*, are the organs which appear to suffer in the most marked degree, from the prolonged or violent paroxysm; but, as may be observed in every form of febrile paroxysm, whether of the yellow fever or malarial form, every organ and tissue of the body, from the skin enveloping the whole, to the moving blood-corpuscles in the interior of every capillary structure within—all, to the remotest bound of the organic system, manifest the active chemical changes going on, and evince in their intimate organization, whether casually or microscopically examined, the wasting and disorganizing influence of the prolonged combustion, which they have sustained under the consummate though distracted sway of the poison-excited nervous system.

After a period, varying, as generally estimated, from forty-eight to seventy-two hours (though we have seen it as short as twelve hours, at which time black vomit, mixed with florid blood, made its appearance, the case nevertheless recovering), and constituting as it were a *single paroxysm*, then succeeds one of repose or *remis-*

[1] Op. citat., iv. 13—15.

sion—the danger appears to be over— the disease itself is indeed over, for it may be said, in most cases, to have *burned out* its material in this single paroxysm. "But this repose, however well marked it may be, proves treacherous, and is followed, not by a recurrence of febrile excitement, as occurs in other forms of autumnal fevers, but by a state of collapse, attended with a series of symptoms of a more or less formidable character, which leads usually to a fatal termination. Among these symptoms, the seriousness of which will not be contested, the ejection from the stomach of a peculiar matter, which, from its ordinary color and appearance, has been long designated by the name of the black or coffee-ground vomit, stands pre-eminent."[1] This "black vomit" is considered by most authors and practitioners, with Sir William Pym, as the most fatal as well as the most distinctly marked symptom of the disease. Hence also we have the Spanish term, "*vomito prieto*," by which they distinguish yellow fever from all other diseases.

Although the *black vomit* is considered so prominent a trait of yellow fever, it, or a discharge analogous to it, is seen nevertheless to occur, under a variety of circumstances. Among these conditions, we find by the report of many authors, and also by cases annually occurring under our own observation, a sufficient number of facts to constitute a strong alliance, by even this symptom, between yellow fever, and certain cases of some of the severer forms of malarial fever. Cleghorn noticed black vomit in the *tertian fever* of Minorca, a fever which is said to have borne but a remote analogy to yellow fever, but in which the utmost danger was to be apprehended if black matter, like the grounds of coffee, was discharged upwards and downwards. Professor E. D. Fenner, of New Orleans, also reports very significant cases in his valuable *Southern Medical Reports*,[2] and we might multiply references to authors on this point—but it is unnecessary—when we can here close this part of our subject by stating that many years have not passed since these cases were of *annual occurrence in our own city*,[3] and its immediate vicinity, and the vomiting of a *brownish grounds* or fluid, evidently the result of effusion of blood into the stomach, is by no means an unfamiliar observation to our practitioners, in cases of malarial fever of the highly congestive grade. The scrupulous and inva-

[1] La Roche, op. citat., vol. i. p. 254.

[2] Vol. ii. pp. 89 and 90.

[3] Augusta, Ga.

riable application of quinine in efficient doses, not only by our physicians, but by the heads of families, the overseers, and by the patients themselves, after the occurrence of the *first* paroxysm, has rendered these cases now of rare occurrence, and death from malarial fever is, happily for us, a most unusual termination.

Hemorrhages.—Closely allied to the *black vomit* are the *hemorrhages*, which, in the words of Dr. La Roche, "occupy a conspicuous place in the list of the symptoms of yellow fever." "Though not peculiar," continues he, "to that form of febrile diseases, they constitute one of its main characteristics. They take place in many mild and moderate cases; are absent in but few of the violent malignant or fatal ones; and issue from a greater variety of parts than is found in most other complaints." The *black vomit* is but a result of hemorrhage into the stomach, but in addition to this, we have discharges of blood occasionally, from every one of the mucous surfaces, "the nose, the gums, the tongue, the mouth, from the conjunctiva, ear, fauces, œsophagus, large intestines, and bladder." Even the *skin* will sometimes yield blood in the form of a discharge, but its collection *under* or *in* the skin in the form of ecchymoses, petechiæ, purpurous spots and bloody discolorations, are by no means uncommon, and serves strongly to indicate the general hemorrhagic tendency so predominent in yellow fever, and which we will find fully as conspicuous in the history of dengue.

This hemorrhagic tendency as remarked by authors, we have found to show itself during the epidemic of yellow fever in Augusta, in 1854, even in certain persons who escaped every other manifestation of the disease. One remarkable case, a mulatto man, residing on that part of the Sand Hills, three miles from the city, in which a few cases had occurred, without any more serious complaint than restlessness during the previous night, vomited next morning a large quantity of tarry-looking, thick fluid, which, when spread out and examined on a white surface, proved to be *blood*. The patient was afterwards confined to his bed, but took no medicine, except a preparation of iron, and recovered without any return of the hemorrhage, or other unpleasant symptom.

Cutaneous Affections.—Besides those skin affections just mentioned as being closely connected with the hemorrhagic tendency of the system during yellow fever, as the ecchymoses, petechiæ, purpura, &c., there are many other forms of cutaneous disease, which appear to be very common attendants upon this fever, to which we make reference in this place, while for their fuller description we must

refer to more systematic works upon the subject of yellow fever. There are: 1st, vesicular pimples and pustular eruptions; 2d, scarlatinous and erysipelatous inflammations; 3d, miliary eruptions; 4th, furuncles and carbuncles; 5th, phlegmonous abscesses; 6th, parotitis, bubo, etc. etc.[1] Some of these affections accompanied the paroxysm, as the scarlatinous and erythematous eruptions, but most of them, as will be observed, was the case in the epidemic of dengue, were attendants upon the convalescence, and here again serve to add to those many points of consanguinity subsisting between these two forms of epidemic fever.

We have thus presented briefly, and we admit very imperfectly, an outline of some of the more prominent characteristics of yellow fever—those in which, it may be said, are manifested its distinguishing traits. Let us notice a few of the features which this disease presents, more in common with the other forms of fever; and we will here reiterate that, it is not our intention to establish, nor is it in the leastwise our belief, that there is *identity* between yellow fever and any form of malarial or other paroxysmal fever. Our object is simply to show such an amount of *analogy* as will render the nosological position we have given to it, acceptable on legitimate principles of classification.

Pain in the head, loins, and extremities, is in yellow fever, even a more prominent characteristic than in almost any form of malarial fever. Pain in the *head* comes on with the accession of the first stage of the disease, and is an early and nearly constant symptom of yellow fever. It continues during the whole of the first stage and disappears more or less completely at the period of remission, or about the third or fourth day.[2]

The *pain* in the *loins*, as stated by authors and observed by ourself, is not less severe, and perhaps even more frequent than the pain in the head. Dr. Rush says, that in the epidemic of 1793, "it was so severe that even the stoutest men complained and groaned under it." Dr. Wragg, of Charleston, remarks that, every single case that came into Roper Hospital in 1854, presented this symptom of *pain in the back*. It was one of the most distressing symptoms. "It was intense in degree, and may be said to be the only symptom that was never wanting." The pain in the extremities

[1] For a full account of these affections with reference to many original contributions on this subject, see La Roche, vol. i. p. 248.

[2] La Roche, op. citat.

extending down from the loins has been also, nearly always a marked and prominent symptom. This is accompanied with a sense of weariness and numbness often. In certain cases described by Drs. Rush, Chisolm, Drysdale, Dickson and Wragg, this pain amounted to agony, and accompanying it was weariness, jactitation and convulsive movements of the most unendurable character. This restlessness and jactitation are exhibited perhaps, more prominently in yellow fever than in any other known disease, and these symptoms, in the words of Dr. La Roche, "may be viewed as *characteristic* of this disease." Wakefulness and delirium are also similarly conspicuous, but the latter pertains more to some epidemics than to others, and is by no means as characteristic of the disease as wakefulness.

Among the *motory phenomena*, besides those already mentioned, we have convulsions, cramps in the arms and legs, subsultus tendinum, tetanic spasms; and "cases occur," says Dr. La Roche, "in which the muscles are affected with partial or complete paralysis. In the summer of 1854, an instance of this kind came under my observation. The patient suffered considerably at the outset of the attack from pain in the limbs, so severely indeed, that the case was taken for nothing more than rheumatism. Soon, however, symptoms indicating yellow fever came on. On the third day the pain subsided, but gave place to paralysis of the lower extremities, which remained immovable to the last."[1] In other cases, these phenomena assumed the character of paralysis agitans. We find another case recorded by Lallemant, in which the sensibility was so exquisite that the slightest touch of the surface elicited the wildest shrieks. The loss of muscular power was complete, the patient, however, recovered, the paralysis and exquisite sensibility disappearing with the advancement of convalescence.

When we would examine the nervous system in order to determine whether pathological changes in the centres will give consistency to the phenomenal *manifestations* of cerebro-spinal derangement, we find that the same difficulty presents itself here, as will be found in all our observations upon similar points which has caused it to become an admitted principle in this department of etiology; viz., that functional manifestation does not necessarily proportionately, represent organic change in either the nerves or the centres. A portion of strychnine which may be capable of convulsing the

[1] See Case 3, J. E. B., on p. 587 of this essay.

entire muscular system and even destroy life, is often found to leave no evidence of organic change in the spinal centres. In the case of inebriates, we find subjects whose nervous systems have been influenced during a long life by alcoholic stimulants, yet manifesting on dissection, no adequate amount of structural change as appreciable by our present methods of investigation. We may say here then, that as in the case of malarial fever, the absence of appreciable organic change in the nervous centres is by no means an infallible argument against our assertion that, the toxæmia of yellow fever presents its most important manifestations *primitively* through the cerebro-spinal system.

We are not, however, entirely without significant records upon this subject. Dr. La Roche says, that in the dissections performed in Philadelphia, the spinal cord was sometimes found more or less gorged with blood, and its membranes apparently the seat of what some would denominate inflammation. Dr. Cartwright, of Natchez, examined the spinal marrow in four cases, and in all the arachnoid and pia mater presented the usual appearances of inflammation, though in a less degree than the same membranes within the cranium. The lumbar and sacral portions appeared more diseased than the cervical and dorsal. The delicate tissues investing the nerves going off from the medulla spinalis, where those nerves passed through any inflamed part were found of a scarlet color.[1] "The results obtained in New Orleans, by Thomas, were not very different; effusion of blood in the vertebral canal, redness of the arachnoid and other membranes, sometimes more particularly in the dorsal region and extending along the nerves. Those noticed by O'Halleran, in Spain, do not differ very materially from the foregoing. Other physicians have found sanguine effusion in some portion of the canal, and an injection of the membranes or of the whole organ, and generally a greater or less quantity of serous fluid—rarely a change of consistence in the marrow itself." Louis presents a case in which the dura mater was of "a clear and livid red throughout its whole extent." There was about a spoonful of serum of a pale red color in the lower part of the arachnoid, and the spinal marrow was flaccid through its whole extent, without having lost its cohesion. The difficulty of autopsic inspection of the spinal marrow during the prevalence of yellow fever epidemics, may very well account for the meagreness of our statistics on the subject of

[1] Med. Recorder, ix. p. 40.

structural change in this important part. But as we have just said, we cannot rest our opinion upon the detection of actual structural lesion, for cases often occur in which the direct influence of the poison upon the nervous system is the only rational mode of accounting for their proving suddenly and quickly fatal "in which no organic or textural alteration appreciable to the senses has been discovered on dissection, all the organs and tissues exhibiting apparently their normal condition, without thickening, softness, swelling, congestion, redness, or too little of any of them, to enable us to refer to them any agency in the effect produced."

We have repeatedly stated that yellow fever is a fever of a single paroxysm of a duration from twenty-four to seventy-two hours. This we believe the reports of most epidemics of true yellow fever will fully confirm; but upon closely scanning the course of this single paroxysm, most writers, and even those who, like ourself, feel no disposition to divide it into several, clearly announce that this long paroxysm is marked by *remissions*, which we here call attention to, in order to show that even under the powerful influence of yellow fever toxæmia, the cerebro-spinal system continues to obey the fundamental law of its normal life, *which is periodical.*

As nearly all the arguments which have been advanced on the vexed question of the *identity* of yellow fever with the various forms of malarial fever, in our opinion, reach only far enough to prove their *analogy* and the common quality that they both originate from blood-poisons, which, though not by any means identical, yet manifest their influence primarily on the *cerebro-spinal system*, we may legitimately here present them without any danger of being accused of arguing the identity of these essentially distinct diseases. The arguments *against* their identity are conclusive and unanswerable, but those *in favor* of identity have fully established their closest and most undeniable analogy, and also clearly point to their classification under the same general head of cerebro-spinal fevers. With this understanding, we are willing here to rehearse a few of the more prominent of these arguments.

Dr. La Roche, who is a decided advocate for the *non-identity* side of this question, after comparing yellow fever with cholera, miliary fever, typhoid fever, relapsing fever, &c., says: "Much more frequently than with any of the preceding diseases, the yellow fever has been confounded with the gastric and bilious remittent fevers of tropical climates and of the summer and autumnal months of cooler latitudes. The idea of their close alliance or identity," he

continues, "is maintained by high authority, many pathologists refusing to acknowledge the existence of any specific difference between them, maintaining that all summer and autumnal fevers, from the slight intermittent or remittent to the deadly yellow fever, are identical in nature, arise from the operation of the same cause, and vary only in respect to the degree of their violence and malignancy." The grounds of this opinion have been thus summed up. We shall only present a few of them.[1] 1st. Yellow fever, when it prevails epidemically in temperate climates, does so in summer and autumn, the very seasons in which intermittent and remittent diseases are most rife. 2d. It shows itself only in those localities where the latter diseases originate and prevail, and the meteorological phenomena which exercise a marked influence on the progress of yellow fever, exercise an analogous influence on that of periodical fevers, in both instances the disease is arrested by frost, change of wind, heavy rains and excessive drought. 3d. Individuals who have taken an intermittent fever in a marshy situation, moderate the effect of the poison and hasten their recovery by removing to a healthy place; the same result is obtained in reference to the yellow fever. 4th. The symptoms supposed to characterize yellow fever—the aspect of the eyes, the nature and seat of the pain in the head, the coloration of the face and surface, the expression of the countenance, the morbid state of the stomach, the nature of the matters ejected from that organ, or by stool, &c., are observed in the other form of disease, and can therefore establish no difference between them. 5th. The yellow, like the other forms of autumnal fever, assumes at various times the *remittent* and the *intermittent*, as well as the continued type, and therefore in this respect differs in nothing from the latter. They are all convertible diseases. Cases commencing with symptoms regarded as characteristic of the yellow fever, frequently assume from the effect of treatment or other circumstances, the garb of a common remittent or intermittent; and on the other hand, cases which at the onset present symptoms of a remittent or intermittent will often acquire the characters of yellow fever, and finally, neither yellow fever nor any of the other forms of these febrile complaints are propagated by contagion.[2]

All of the above arguments, and many more which can be found scattered up and down throughout the literature of our subject, are of sufficient force fully to establish, as we have said, a strong analogy

[1] Op. citat.

[2] Op. citat., vol ii. p. 589.

and kindredship between these fevers, but when viewed in the light of a more extended observation by a less biassed judgment, they utterly fail to establish their identity. "All these circumstances," says Dr. La Roche, "prove doubtless that all these diseases are the products of morbid agencies or poisons of kindred nature. By the side of these, facts and arguments have been accumulated to disprove the doctrine of unity as applied to the diseases in question, and to show that, so far, its advocates have done little beyond pointing out a fact no one has denied, namely, the existence of an affinity or family likeness in point of symptomatology, pathology, and etiology, between the two diseases; while reasons stronger than any they have adduced may be found to establish the independence of each of these, and their claims to be considered in the light of different and distinct complaints, and consequently to occupy a separate position in every nosological arrangement."[1] We hope hereafter to give to yellow fever such a position that, while its affinity with the various forms of malarial fever, imposed upon it by the prominent implication of the cerebro-spinal system which they *in common* present, shall be respected, will yet retain for it that individuality and distinctness which its peculiar toxæmia and epidemic character must rightfully secure to it.

We have thus, in a most cursory and confessedly imperfect manner, attempted to depict some of the more prominent characteristics of yellow fever. Along with this brief account of the disease itself, we have also endeavored to develop, by our several references, in some degree, the *history of opinion* in regard to its affinity to malarial fevers on the one hand, while at the same time it has been shown on the other, that the diseases are not identical. The arguments for its close *affinity* and yet *non-identity* we think are sufficiently conclusive, even so far as we have proceeded, but in our opinion both of these positions can be much strengthened by a brief comparison of yellow fever with another peculiar form of disease which, while it is strongly analogous in many of its most prominent characteristics to malarial fever and to all intents and pur-

[1] Were we *arguing* the non-identity of these diseases, we would find most available arguments in the valuable Essay upon the Relation of Bilious and Yellow Fever, read before the Medical Society of the State of Georgia. By R. D. Arnold, M D., Professor of Practice in the Savannah Medical College. This Essay, together with the elegant and correct lithographs illustrating the varieties of the bronze liver of bilious fever and the yellow fever liver, constitutes a valuable contribution confirming this portion of the science of fevers. For Essay, see *Southern Medical and Surgical Journal*, vol. for 1856.

poses undeniably a cerebro-spinal affection, yet bears so close an affinity to yellow fever that it may be said to hold the midway position of a *transition form* between the two diseases. This disease is *dengue*, which, on the highway of pathology, is like those organized beings found here and there along the road of transcendental anatomy, each serving to "bridge over" a chasm between two promontories which, though looking boldly towards each other, could never without it, perhaps, be made smoothly to connect.

II. DENGUE, BREAKBONE, OR NEURALGIC FEVER.—It is yet fresh in the memory of many of the profession in this country, that in its epidemic manifestations, the year 1850 presented some marked peculiarities. From New York,[1] and perhaps even further north, to Louisiana,[2] may be collected published details of an unusual form of disease, presenting, in different localities, it is true, a varying degree of intensity, and also slight differences in phenomena; but in its main distinguishing characteristics of type and mode of progress, ever the same well-marked but novel and unfamiliar lineaments. All reports describe the attacks as attended by great pain and suffering, marked by nearly the same duration, and most of them agree in the almost invariable non-fatality of the disease. In order to present a reliable account of this peculiar and wide-spread epidemic, we here record abstracts from the various histories published throughout the country towards its close. We shall begin with the record which relates to Augusta, our own locality, using this as the basis of our present description of the disease, both because here we conceive that it presented all of its well marked traits, and further because of it we can truly write:—

> ——— "Quæque ipse miserrima vidi,
> Et quorum pars magna fui."

We submit the following without even correction, notwithstanding the evident haste with which it was at the time prepared, in order that it may have the force of a "true copy from the records." A similar course we shall pursue with our abstracts from the accounts given by the reporters in other localities in which the disease prevailed. As to any *previous* accounts of the disease about

[1] See an Account of an Epidemic which prevailed in Alleghany County, New York, during the autumn and winter of 1850–51, by R. P. Stephens, M. D., of Ceres. Transactions, vol. iv. 1851, p. 227.

[2] Report on Fevers, &c., of New Orleans, by E. D. Fenner, M. D., ibid. Also, Fenner's Southern Medical Reports.

to be described, none of them, with the exception of Dr. Dickson's, can be considered reliable. "Drs. Cocke and Copland," says Dr. Austin Flint, the able Chairman of the Committee on Practical Medicine for the year 1851, "apply to an epidemic affection supposed to be analogous, the title of *scarlatina rheumatica*, an appellation less significant than the more homely names before mentioned, and certainly not more appropriate, inasmuch as the disease does not appear to have any essential relations with either scarlatina or rheumatism." In 1827–8, it prevailed extensively in the West India Islands, and thence extended over the same portions of the United States which it has recently revisited. Dr. Rush describes an epidemic, presenting characters strikingly similar, as prevailing in Philadelphia, in 1780. It was then commonly known as the "breakbone fever." But the first really authentic account we have of the disease, is that published by Prof. S. H. Dickson, in *Bell's Medical Library* for 1839, based upon the epidemic of 1828. Since the publication of this memoir, the names Dickson and Dengue have been intimately associated in the mind of the profession, and "Dengue fever" has become the accepted nomenclature indicating the peculiar train of phenomena presented by the disease.

Dengue Fever, as it prevailed in Augusta, Ga., in the year 1850.[1]—In the present article, we propose submitting a brief notice of the epidemic fever which has so lately prevailed in our city, under the various names of "Dengue," "Breakbone," and "Neuralgic Fever." As will be seen by reference to all the accounts of the disease, as it occurred during the past season in various localities, it was also here, preceded by a protracted period of unusual heat and drought. For many years past, the almost universal type of our summer and autumnal fevers has been intermittent or remittent; indeed this tendency is so predominant in our locality, that a continued fever is almost unheard of among us during the seasons above mentioned.

As early as the beginning of April, the unusual number of cases wherein the paroxysmal type was very obscure or did not at all obtain, was the subject of remark. In many, the fever would expend itself in one long paroxysm, without the well-marked characteristic stages so constantly observed by our fevers of ordinary seasons. On the 22d of August, my brother and associate, Dr. R. Campbell, saw a case in which he has since recognized most of the

[1] History and Treatment of the Dengue Fever, prevailing in Augusta, in the year 1850, by Henry F. Campbell, M. D., Demonstrator of Anatomy in the Medical College of Georgia. Southern Med. and Surg. Journal, vol. vii. p. 20, 1851.

characters of the epidemic—though at the time it was viewed by him as a remittent of somewhat obscure type, similar to others that had occurred to us earlier in the season. This case was characterized by great prostration of strength, loss of appetite, furred tongue, depressed pulse, and dry but moderately hot skin. It lasted four or five days, was not at all amenable to treatment, and the convalescence rather tardy, attended with protracted muscular feebleness. Shortly after, other cases appeared in a part of the city quite distant from the above, somewhat better marked than this; but even these did not pass with us as confessedly cases of Dengue. About the 10th of September, the disease became fully manifest in all its unique and indubitable individuality. Then, what was dreaded in the vague uncertainty of rumor became more manifest in the tangible reality of painful, personal endurance.

The popular name of breakbone fever has pretty generally here, as elsewhere, been adopted in common parlance, to designate the disease. The term neuralgic fever has been suggested, along with various others; but inasmuch as the disease in all its important characteristics, so closely resembles the Dengue of 1828, in Charleston, described by Dr. S. H. Dickson, we have adopted this nomenclature as the one least liable to produce confusion, in a comparison of the reports of the epidemic as it has prevailed here and elsewhere.

Here, the disease was usually preceded by a period of discomfort, varying from twelve to thirty-six hours, in which the patient was disinclined to engage in any exercise whatever, mental or physical. In its accession, he suffered first from a feeling of extreme fatigue—had a disposition to extend the limbs, and to stretch and gape—there was frequently severe pain in the loins, attended with general lassitude and debility. There was loss of appetite; the tongue slightly furred, but red and not very dry; some thirst, and occasionally, even in this stage, nausea would add to the general distress of the patient, though most frequently it characterized a later period of the disease. On examination, we would find the spine almost invariably tender, especially in the lumbar region, where most of the suffering was referred. The pain would also extend down the course of the nerves of the inferior extremities, even to the end of the toes. Frequently, the superior extremities would be affected in the same manner, while the intercostal nerves also would indicate most definitely their distribution in becoming channels of distress to the patient. But, above all, perhaps the

most invariable attendant on the earlier stages of the complaint, was the severe pain in the frontal and temporal regions, which, in the majority of cases, became par excellence, the torture of the disease. The eyes also became affected with a species of rheumatic tenderness, which rendered their movements quite painful. Sometimes, there was total inability to move the eyes; the skin was generally dry and hot; the pulse quick and full, varying from 80 to 120 per minute in the adult: the heat of the surface did not always correspond with the frequency of the pulse. After a continuance of from two to eight days, the pain in the head and loins would subside, the fever decline, and the patient begin a slow and unsatisfactory convalescence.

In the vast majority of cases, though not invariably, during some period of the attack, there appeared on the surface an eruption, which, in adults most frequently, according to our experience, would assume the forms of urticaria or erysipelas, while in children, scarlatina and rubeola were the diseases simulated. This eruption, of whatever form, was usually attended with much itching and burning over the surface, followed often by partial or general desquamation. We have found it most frequently in those cases that have suffered from gastric and intestinal derangement, and on the appearance of the eruption, there was much abatement in the violence of the symptoms.

Above, we have given the progress of perhaps the generality of cases, but by no means the course *invariably* pursued by this truly protean epidemic. In many cases, the brain gave evidence of being much affected throughout the whole course of the disease. Sometimes, there was stupor so profound, that it was difficult to arouse the patient even for a moment, while in others, the most obstinate watchfulness obtained, amounting even to delirium. In these cases the pulse was full, hard and rapid, the skin hot and dry, and the headache and lumbar pains unusually violent. Another point of variation, is the mode of attack: in some, instead of the gradual approach above described, the patient would be taken with a chill, more or less violent, attended by great nausea and vomiting; in others, the prostration was sudden, even on the first day rendering him unable to undergo muscular exertion.

We have already adverted to the nausea observed during the earlier stages of the attack. There were cases wherein this symptom was persistent throughout the whole period, accompanied by vomiting or violent retching. The patient would complain of ten-

derness in the epigastric region, with a sense of great oppression. There was much thirst, and with this urgent craving of cold fluids, the stomach would not retain them more than a few moments. The tongue in these cases was unusually red, with prominent papillæ; sometimes with a whitish fur in the centre, at others perfectly clean. Where nausea obtained, the eruption was tardy or altogether absent, and on its appearance, the gastric distress usually abated. The pulse was frequent, but depressed, as observed during chill—the skin not generally very hot. The condition of the bowels has varied exceedingly: in the majority of cases, they were in a natural condition, especially where the attack was sudden, then, its access would be preceded by constipation of twenty-four to thirty-six hours, and again a copious diarrhœa would usher in the disease, or be superinduced by the mildest laxative. The tendency to diarrhœa, we found exceedingly embarrassing to our treatment, as it was frequently the case, where purgatives were apparently plainly indicated, a slight laxative would produce the most uncontrollable hypercatharsis. In one case, the bowels being constipated for days, the patient was urgent for a cathartic: being aware of the tendency to catharsis, we indulged him only with a saline enema: a purgation ensued which was extremely inconvenient, and which was checked only by large doses of opium, by the mouth and by enema. The same irritability, though perhaps in a less marked degree, was observable in many of the cases that came under our observation. We will refer here to another, in which this was even more remarkable than the above, where a most troublesome diarrhœa and prostration was brought on by a mild dose of rhubarb and magnesia. The diarrhœa here was so obstinate that all concern for the case was merged into the desideratum of arresting its prostrating draughts upon the patient. The passages were generally copious, and at the end of each evacuation the patient was tortured by violent tenesmus with pain in the rectum.

The condition of the liver varied also—though, from the color of the stools and the absence of bile in the matter vomited, it is probable that it was most frequently torpid, or at least not in the excited condition observable during many of the paroxysms of our autumnal fever. The urinary organs presented nothing remarkable; we can recall no case of hæmaturia complicating the disease.

Of the hemorrhagic tendency[1] of this epidemic, our observations

[1] The blood never coagulated, as observed on these occasions. It was dark and fluid; no experiments were made otherwise to test its condition.

were numerous. In a few cases, the nose was the seat of hemorrhage; in two, the gums; in one, the mucous membrane of the lungs and also the gums; in many the bowels; and the cases of vaginal and uterine hemorrhage were perhaps the most frequent of all. The blood discharged from the gums was of a dirty, venous color; it presented the appearance of blood undergoing incipient putrefaction. In the case where the blood was discharged from both the gums and lungs, the difference between the two fluids was remarkable—that from the gums being of the character above described, while the expectorated blood was of a bright red color, and in parts resembled very nearly the lateritious sputa of pneumonia. When the hemorrhage came from the bowels, the passages were dysenteric and more or less mucus was mixed with blood, the proportion varying according to the predominance of the hemorrhagic tendency. Frequently, the dysentery would be of the most obstinate character. One case we relate in illustration: Mrs. L——, having passed through the stages of dengue, regularly, during her convalescence was attacked by a copious diarrhœa, which continued unrestrained under the most energetic astringent treatment. Soon after, dysenteric symptoms became manifest, and she discharged a considerable quantity of blood and mucus at each evacuation. Every astringent means we could suggest was put in requisition, with only temporary effect; passages, fluctuating between a diarrhœal and dysenteric character, continued to recur, with incredible frequency, for nearly three weeks, until the patient was worn to a mere skeleton. Although not on the treatment, we mention here that this case appeared to receive its first impulse towards recovery from the application of a small blister to the sacrum, suggested by our friend, Dr. L. D. Ford, who was in attendance with us.

The relation which this disease sustained to the menstrual function is, according to our observation, truly remarkable: it was invariably a provocative of the discharge. Should the disease exist at any time near the period of the catamenia, we have found it very apt to produce it; should it be before, but within several days, the discharge would anticipate its regular period, and also be unusally copious; should this period have passed, even by the lapse of several days, a recurrence of the discharge would be induced amounting, sometimes, to true hemorrhage. Menstruation occurring at this time was usually painful, probably owing to the excitable condition of the general nervous system.

In the pregnant condition of the womb, the supervention of dengue was an occurrence attended with much danger to the well-being of gestation. The number of miscarriages was very remarkable, and in the latter months of pregnancy, premature labor was a very common result of the attack; and, indeed, we have been forcibly reminded of that passage, which we quote most reverently, "woe unto them that are with child in those days;" for of all attacked, those females who happened to be in this condition had most to dread from its advent. A species of pains resembling what is known, in obstetric language, as *false pains*, would precede the contractions, and seemed to be excitor of them, if not arrested. Miscarriage, superinduced by dengue, differed from this accident occurring from other causes, in the fact that, if treated early, its prevention was more easy in the former, and also the lumbar pain, first felt, was independent of the condition of the womb, and instead of being the *consequence*, soon became (or rather the irritation upon which it depends) the *cause*, of the miscarriage. The lumbar pain, in ordinary miscarriage, is a true *symptom* of this approaching catastrophe, indicating most frequently its *early* occurrence, whereas, in dengue, the pain in the loins must obtain for a considerable time, when it becomes a *cause* of the accident.

In connection with the hemorrhagic phenomena of the disease, we mention a case of purpura, kindly reported to us by Dr. I. P. Garvin, of this city. The subject of the disease was a child, and it did not extend further than the lower extremities. He considers its situation influenced by the dependent position of these limbs, and as that diathesis prevailed during the attack, gravity determined it to the extremities. Drs. L. A. Dugas and J. A. Eve permit us to refer to cases occurring to each, wherein the patient vomited matter analogous to black vomit, closely resembling coffee grounds. In the two cases of Dr. Dugas there were also copious dejections of a similar character.

Convulsions, in children, have been very common in this disease; and when we consider the truly nervous character of the complaint, we cannot be surprised at this complication. In paroxysmal fever, we know that convulsions are of frequent occurrence, and here, we have *a disease which, in the condition of the nervous system, is similar, as we believe, to its condition under a prolonged paroxysm*, and in the susceptible innervation of the child, we find ample predisposition to the convulsions. In some cases, the convulsions were of a most obstinate character, continuing for many hours, and

returning with remarkable tenacity. One marked feature of our epidemic we have, until now, omitted to notice; yet, from its frequency, it may be considered among its prominent characteristics. We refer to the relapse so generally succeeding the period of apparent convalescence. On the fourth or fifth day from the access of the disease, the patient, having passed through the attack as above described, will experience a respite, varying from one to two or three days, and then, without apparent cause, the headache and pain in the back return; nausea and vomiting, even if not existent before, will now almost certainly ensue, and the eruption also, at this period, will either be seen for the first time, or reappear—the febrile symptoms, however, do not usually run so high as during the earlier stage of the complaint. The period of relapse has a duration of from two to four days, when, with this last sally, the monster looses his grasp upon the devoted patient, leaving him ill-natured, depressed, and wrecked. The appetite is gone, and in its stead, a most villanous and persistent *taste* is left to sophisticate the delicacies which are the natural and rightful concomitants of an ordinary convalescence. We have noticed in the convalescence of several cases, various annoyances, such as falling of the hair, eruption of boils, and an obstinate wakefulness, which, in one instance, terminated in temporary insanity, rendering imprisonment necessary for the welfare of the patient.

From various calculations we have seen, we think, the number of cases in Augusta during the past season may be estimated at between eight and nine thousand—the majority of which did not receive the attentions of a physician, being subjected to domestic treatment. Out of this vast number, we have not heard of a single death from the epidemic, uncomplicated. Indeed the prognosis of the disease, under ordinary circumstances, was invariably favorable.

A comparison of this disease with the epidemic of 1828 prevailing in Charleston, and so ably described by Professor Dickson, with whose name the very term *Dengue* will be ever inseparably connected, allows the following conclusions, viz: that while the epidemic of '28, was an *arthritic* disease, affecting the joints (especially the smaller joints) in a manner similar to *articular* rheumatism, the present is neuralgic, and bears the same relation to *neuralgic* rheumatism, that the other did to the *articular* form of the disease.

In the former epidemic, the sequelæ were those of articular rheumatism, whereas, in the present, we have heard of but a single case,

out of the multitude, wherein anything of the kind obtained. This isolated case was in the practice of Dr. L. D. Ford.

Above, we have given a brief history of the more prominent peculiarities of this epidemic as they have appeared to us, on a review of our observations of them during the past season. For the last month, the disease has disappeared, with the exception of an occasional case. Scarlatina, which had preceded it, and seemed extinguished, or "disguised in its livery," during its prevalence, is again making its ravages among us. From several cases of this disease, we think we discover a greater tendency to convulsions than usual, whether determined by the previous prevalence of dengue, or not, we are unable to say.[1]

From the self-limited nature of the disease, the treatment, of course, could not, in accordance with the true principles of therapeutics, have been other than palliative. Any effort to cure or shorten an attack, would, in our opinion, have been as vain as to have attempted to modify the natural and fixed phases of rubeola or scarlatina. Yet, we consider that dengue had its appropriate and necessary treatment, for although "no one could die of the breakbone," still, from the serious amount of suffering to which its victims were subjected, palliation became a very desirable object.

The details of the history of the above epidemic will be found to vary but little in Charleston, as presented by Dr. S. H. Dickson and Dr. Wragg, from those given by ourself as it prevailed in Augusta.

"The access of the disease," says Dr. Dickson, "might be slow or sudden. If the former, there was a stage of lassitude, sensitiveness to a current of air, with dryness of skin. A formed chill rarely preceded. Most persons had a dull headache, with some intolerance of light. In general, anorexia was present, though some retained more or less appetite throughout. The tongue was clean and red. Pain gradually diffused itself over the back and limbs; many became drowsy, with red eyes; the pulse, usually a little increased in frequency, in some remained unaltered; and thus two, three, four, or five days would pass off, with great complaint of languor, debility, and discomfort. . . . In the majority, the attack was sudden and violent. The patient was seized with severe headache, intolerance of light, universal distress, and oppressive debility. The skin was hot and dry; the face flushed, the eyes red and

[1] Since the above was written, as many as four cases of scarlatina, attended by convulsions, have come to our knowledge.

watery; the pulse tense, quick, and frequent. The patient was exceedingly restless, and soon complained of intense pains in the back, limbs, and large joints. In some the stomach and bowels were the seat of violent pain."

"The febrile paroxysm," he continues, "was of various duration; and the local determinations might also vary, except as to the head, which, so far as I have heard, was universally affected. In some there was delirium throughout the febrile part of the attack. I noted carefully in several, the length of the first or febrile stage. In one, it was only six hours before the skin became moist and the pulse abated in frequency. In nine hours the remission was well established; but a degree of circulatory excitement prevailed for nearly twenty-four hours, when it left the patient and did not return. The pains in the head, back, and limbs, continued with little abatement, however, for about forty-eight hours, when they gradually subsided. The patient was up on the sixth day, but in this case there was no eruption. In no other case did *I see a paroxysm of less than twelve hours. The average, I think, was about thirty-six.*[1] *In a few instances it lasted for two, three, and seldom for four days.* I saw no remissions nor intermissions, but heard of many cases, both remittent and intermittent. There was in the fully formed attack *two very definite stages with an interval clear of fever.* This interval of two to four days, was sometimes so free from suffering that patients would rise from bed and lounge about the house, complaining only of debility, or even if resolute, resume their ordinary habits and occupations. But, on the fourth or fifth, they would again yield to oppressive malaise and weakness, and seek the recumbent posture. A return of pain to the head and limbs if it had disappeared; often a recurrence of febrile excitement would mark the access of this second stage. The tongue, which, until now, had been clean and red, would put on a thick yellowish fur; the stomach would be more or less nauseated—very seldom to the extent of retching or vomiting; and this state of things would remain until on the fifth, sixth, or seventh day, when some cutaneous eruption would exhibit itself, usually with a sense of heat and itching.

"The time of access of febrile paroxysm in the majority of those whom I could observe closely, was about ten in the morning—the hour of access of tertian. The subsidence was marked by profuse sweating in most." In the treatment, the hastening forward of this sweating stage seemed to be a prominent indication. Dr. Wragg,

[1] The Italics are ours.

coincides very closely with the two preceding histories of the disease.

"The attack commenced with languor, lassitude and feelings of general uneasiness, with nervous tremors, sometimes lasting for several days." The pains associated with the febrile movements, and which often took place before the fever was developed, are thus described: "Pain in the head, most acute in degree, sometimes confined to one part, and that often only a small spot, which was usually the temple, brow, or one or both eyes. Sometimes it was general. In several cases the pain in the head extended down the entire face, being very severe in the ears, the angles of the jaws, the malar bones, and along the whole line of the dental rows of both maxillary bones. This caused the most intense suffering, and gave a sensation as if the teeth were started from their sockets. There was intense pain and soreness in the balls of the eyes, so that touching them with the fingers or even closing the lids on them, produced suffering. This symptom, however, was often wanting. There was great pain in the muscles of the back of the neck, running up to the head, and occasionally a sense of weariness, which was very annoying." He also describes patients with intermitting pains, and one in which there were involuntary muscular jerkings. "In many cases," he continues, "there was great pain in the shoulders and back, but most generally in the loins and low down towards the sacrum, running round the waist, &c. Sharp shooting pains shot down the thighs and legs, being most intense and pungent in the knees, where they often took the darting character of that in the head. So great was the uneasiness, that in many instances patients could not find rest or ease in any position for five minutes at a time."

"The fever was usually ushered in by a chill and accompanied for many hours with a chilly sensation, alternating with flush." The tongue is described by Dr. Wragg, as being covered with a thick pasty fur, the taste destroyed and the mouth dry, &c. "The pulse moderately full and quick, but never very active in either force, quickness, or volume. The skin was dry and harsh at first, and in some cases, continued to the end of the fever, but generally it became moist, and often covered with a free perspiration. In some cases, during the continuance of the heat and dryness of the skin, these became of so extraordinarily pungent a kind, that the sensation in touching the patient's skin did not leave the physician's hand for some time."

Dr. Wragg describes the various forms of the eruption as scar-

latinal, rubeolous, urticarious and petechial, while a few cases were papular, and some resembled prickly heat; but Dr. Dickson describes them more fully than will be found in either of the other reports. To the forms of eruption described by the preceding reporters, Dr. Dickson adds the variolous, lichenoid, phlegmonoid, miliary and purpurous. The disease was in most instances either attended or succeeded by an eruption, but there could not be said to be any particular specific form of "dengue eruption."

Dr. Dickson describes the ordinary duration of the disease as about eight days; Dr. Wragg says it lasted from three to six days, while in our own account, it is seen that the duration varied from two to eight days. Dr. Wragg reports cases as becoming *intermittent* and continuing under that form for from two to three weeks; this decided intermittency did not occur to us, the only approach to it was the abortive attempt at the second paroxysm on the second or third day after the subsidence, in which the pain would recur, but seldom attended by much fever. Dr. Dickson, in summing up the graver symptoms of the disease, says that, "the most alarming phenomena were convulsions, delirium, great gastric and intestinal disorder, great failure of the pulse on the subsidence of the early febrile paroxysm. Convulsions in children, occasionally ushered in the attack." In regard to the failure of the pulse, our own experience supplies us with many cases in which, but for large potations of brandy, the patient, it appeared to us, notwithstanding the uniformly happy termination of the disease, must have died at this stage of the complaint. This was the stage which, in Augusta, was marked by the prostrating nausea and vomiting. Brandy was borne in surprising quantities, even by delicate females, in this stage, and was apparently craved by all who had ever before known the sensations produced by its potations. Delirium tremens is recorded in all three of the reports from which we have quoted, as either one of the attendants or sequelæ. This peculiar disease, unlike the ordinary forms of cerebro-spinal fever, prevailed but little, or not at all in the rural districts; but, like yellow fever, invariably committed its depredations in large cities or thickly settled neighborhoods.

We have thus attempted to picture, from the three reports above given, the peculiar features of this unusual epidemic as they were noted at the time of its occurrence in two localities,[1] Charleston,

[1] We much regret that we could not procure, in time for this report, "The History of the Epidemic Dengue which prevailed in Savannah, Ga., in the summer

S. C., and Augusta, Ga., in which places it may be said to have prevailed with all the striking characteristics of *its own individual type.* As we proceed further south, as in Montgomery and Mobile,[1] we find it presenting slight modifications, till, in New Orleans, it has so far assimilated itself to the great endemic of that locality, yellow fever, that some of the most observing and experienced practitioners there, do not recognize it as a disease *per se.* We find Dr. E. D. Fenner, than whom no one can be found possessing larger experience or clearer views with regard to yellow fever, holding the following language, in regard to dengue, as he had observed its phenomena presented in New Orleans:[2] "Now the question is: Has any *new and distinct disease* made its appearance, and prevailed in these places?[3] Or have we only witnessed *a slight modification of our customary endemic fevers which, though extensively prevalent, have been unusually mild?*[4] In my opinion, the latter is the *true position;* and I will endeavor to prove it by the occurrences of the times in this city, and by carefully arranged statistics." "The term *dengue,*" says he, "came into vogue in the summer of 1848, when there was a great deal of endemic fever of all kinds, but with types indistinctly marked. But few cases were recognized as yellow fever at the onset, or even in the end, if they terminated favorably; they were then called *dengue* or *bilious fevers.* But all such cases," continues he rather sharply, "if neglected or maltreated, were *liable to die,* and whenever this occurred, they seldom failed to present *indubitable marks of yellow fever,* and were so pronounced in the bills of mortality."

We quote the above remarks of Dr. Fenner's, more to illustrate how dubious a form the epidemic assumed in New Orleans, which had such marked individuality in Augusta and Charleston, the same year, than with the view either of confirming or denying his position, with regard to its identity with either the malarial or the yellow fever. This variance of opinion among the experienced and intelligent practitioners of New Orleans, however, is a most

and autumn of the year 1850. By Richard D. Arnold, M. D." See Charleston Med. Journ. and Review; also Fenner's Southern Med. Reports, 1851.

[1] See Report of Diseases of Mobile, by W. H. Anderson, M. D. Transactions of Alabama State Medical Association, 1850.

[2] See Report of Committee on Practical Medicine for 1851. Transactions, vol. iv. p. 205.

[3] Referring to New Orleans, Mobile, Natchez, and Vicksburg.

[4] The Italics are Dr. Fenner's.

significant fact, if not for the identity, at least for the *very strong alliance between dengue and both the other varieties of fever in question, viz: yellow fever and malarial fever.* This is all we wish to illustrate in the present part of our discussion.

Although Dr. Fenner, in view of the entire absence of dengue in the reports of the New Orleans Charity Hospital for the months of August and September, 1850, is led to the conclusion, "either that *no*[1] *such specific complaint, entirely different from the customary endemic fevers of the season existed; or if it did, its distinctive characters have yet to be pointed out so that it may be more readily recognized,*" he yet candidly acknowledges and points out *unusual features* in the fevers of that summer and autumn in New Orleans. These unusual features indicate that so far as the customary endemics were modified by the peculiar epidemic prevalence of the year, they were more nearly *assimilated* to *dengue* than to any other form of disease. The following is his decided language on this subject:—

"I may then be asked if the fevers of this summer and autumn presented *any unusual features whatever?*[1] And if they did, what were they? I admit they did, and will briefly point out some of them.

"1. They were of the mildest general character, to prevail so extensively, probably ever witnessed in this city.

"2. They were more generally attended with *bilious vomitings*[1] than usual.

"3. There was a remarkable tendency to *hemorrhage* at the *critical stage*,[1] most commonly from the *nose* and *uterus* (and these were generally favorable), but sometimes from the *gums, stomach,* and *bowels.* Hemorrhage from the stomach made *black vomit,* and such cases were admitted to be *yellow fever.*[2]

"4. Severe attacks were marked by violent and dangerous *head symptoms.* Hence so many deaths in the bills of mortality from '*congestive fever*' and '*congestion of the brain.*'

"5. A great many cases were aggravated by *boils* and *prickly heat,* which arose from the extraordinary heat of the summer. A few cases presented a *peculiar slight eruption* on the skin, not commonly seen in our summer and autumnal fevers, but noted as an *occasional occurrence* by writers on the fevers of the South. The

[1] The Italics are Dr. Fenner's.

[2] By reference to our own report, it will be seen that discharges of this kind did occur in several instances, but none of them died, nor were any admitted to be yellow fever in Augusta.

females in the Charity Hospital presented a remarkable flushing of the face and skin generally, with redness of the eyes, much like yellow fever, but accompanied by a corresponding severity of other symptoms.

"6. I witnessed no extraordinary *arthritic* or *rheumatic pains*, or any affection of particular joints, causing lameness, as was attributed to the *dengue* of 1828.[1]

"These are all the striking features of the late fevers I deem worthy of notice at present, and I do not consider them sufficient to signalize the presence of any *distinct* or *peculiar disease*. More or less of them all are to be seen in our summer and autumnal fevers every year."

There evidently was in the character of the disease, as it prevailed in New Orleans, at least, plausible ground for Dr. Fenner's opinion of the *identity and mildness of type* which he assumes in each one of the above six propositions, in which his very admissions appear only to confirm his opinion; but in the Augusta and Charleston epidemics, there was no possibility of alleging anything beyond a *strong affinity* to either ordinary *autumnal fever* or to *yellow fever*. The term *mild* could not be applied, even relatively, to but few of the cases, and the comparison could only refer to other cases of the same disease. Cases of bilious or yellow fever manifesting the symptoms characterizing the ordinary cases of *dengue* would be deemed anything but mild, and the prognosis would portend a fatal termination, but this was not the case; the severest cases—indeed *all the cases of dengue recovered* in Augusta, and we had no *fever*-mortality bill whatever during its prevalence. We estimated the number of cases "at between eight and nine thousand—the majority of which did not receive the attentions of a physician"—this was because their services could not be procured. It seems that nearly *everybody suffered severely*, and yet *nobody died*.

In the review made of this disease by the distinguished reporter for the Association in 1851, Dr. Austin Flint remarks:[2]—

[1] It will be observed that in our own report of the disease prevailing in Augusta, we recorded this difference between the epidemics of 1828 and 1850, and yet Dr. Dickson, who is the historian of the epidemic of 1828, as well as of that of 1850, terms both dengue. The pains were of a purely *neuralgic* character, scarcely any *arthritic* or *rheumatic*, and we do not recollect a single case of lameness caused by the epidemic of 1850, whereas they were abundant after that of 1828.

[2] See Transactions, vol. iv. p. 178.

"Respecting its *pathology*, beyond the statement of its being a species of essential fever, the Committee do not feel prepared to offer any remarks, nor can they assume to say whether it is to be regarded as an affection properly entitled to a distinct local habitation and name in nosology, or whether it is a mere common disease, presented with uncommon characters. The latter is a question which would be more properly discussed by those prepared by clinical study of the epidemic, and who are at the same time familiar with the diseases of the South."

Notwithstanding that both these latter conditions so justly proposed by Dr. Flint obtain in our case, in our brief discussion of the pathology of dengue, we shall proceed with the same care, as with the most unfamiliar form of febrile disease which we have yet examined.

To make the formal assertion at the present stage of our investigation, that dengue, a disease which, from the early manifestation of pain, and the many other indications of aberration in the *sensory* functions, has acquired the synonymes of "neuralgic fever," and "break-bone fever," is, according to our method of classification, a *cerebro-spinal fever*, will doubtless appear to many a futile enunciation of an already admitted truth. And yet, to be able to make this, to us, important assertion in safety from successful contradiction, has been the object of our careful preliminary presentation of all the phenomena exhibited by the disease. *Dengue, then, by the character of its intrinsic phenomena*, viz., *the early manifestation of pain, the uniform spinal tenderness, the lassitude*, and *convulsive phenomena, as well as by its close and acknowledged alliance to other fevers which we have shown to be cerebro-spinal, is most prominently entitled to the name of a cerebro-spinal fever.*

We have just shown, by abundant evidence, that dengue is closely related, in many of its most prominent characteristics—its mode of access, the progress of the paroxysm, its pretty uniform sweating stage—to autumnal fever, while we find that in some places, the disease has been described as "*an epidemic bilious remittent*,"[1] from the recognized affinity between the two diseases. But,

[1] See New Orleans Medical and Surgical Journal for March, 1851. "Description of an Epidemic Bilious Remittent, by A. Duperier, M. D., of New Iberia, La." "This writer," says Dr. Flint, "describes the symptoms of a series of cases which occurred of a novel disease, which is undoubtedly the same as that observed at Charleston and Augusta." "In six weeks, 210 out of a population of 250 had

on the other hand, no one will, we think, deny that the result of our examination into the history of this truly mongrel form of fever, no less allies it to yellow fever. Its single, prolonged, and violent paroxysm, the succeeding temporary calm, followed by the abortive attempt at a second paroxysm, the prostration of the stomach, the nausea and vomiting at this particular time, the general tendency to hemorrhages, but especially the occasional appearance of actual *black vomit*, when considered in connection with the epidemic character of the disease, and the variance of opinion among the experienced physicians of New Orleans, all, we say, present points of such undeniable, indeed, unquestionable, *affinity between dengue and yellow fever*, that its alliance with malarial fever, though strongly marked, becomes weakened by comparison, and in all our nosological arrangements hereafter, we shall ever be compelled *to associate these two forms under the same generic head*—each to be discriminated by only *specific* characters of difference. What, then, we may ask, is this *common element* which, running through all these varieties of fever—autumnal fever, yellow fever, and dengue—which, like a deep-laid cable, indissolubly binds them together in a mysterious, and yet most indubitable affinity, causing the phenomenal presentations of the one form to be constantly mistaken for those of the others, each of which are essentially different, and affording plausible arguments for their identity. What, we repeat, is this *common* element? Our answer may be thus stated—*though each of these forms of fever is due to a* TOXÆMIA, *probably of a specific and entirely distinct kind, which fact will account for the intrinsic and individual characteristics of each, yet all of them arise, in common, from the same dynamic source,* THE CEREBRO-SPINAL SYSTEM; *and, whatever may be the amount of specificness each one of them presents, the fact that one profound common principle ever guides and directs the presentation of the phenomena in them all, will satisfactorily account for the strong ties of affinity always recognized between them, and compels us to class them under the same general head of cerebro-spinal fevers.*

Having completed the foregoing hasty examination of the two epidemic forms, yellow fever and dengue, we here close our discussion of that entire department, the various members of which we have endeavored to associate under the comprehensive name of

gone through the disease, without a single death having taken place." This writer considers the epidemic to resemble both the breakbone of Rush, and the dengue of Dickson, and *for this reason* calls it *epidemic bilious remittent.*

cerebro-spinal fevers. Our reasons for keeping these two varieties out of our general considerations of fever, have been candidly and fully stated, viz., because, although they agree sufficiently well in all their essential characteristics with the other forms of paroxysmal fever, to entitle them to be placed among cerebro-spinal fevers, still they present certain traits, arising probably from the peculiar character of their specific toxæmia, which render them aberrant; and in their phenomena, they do not so conspicuously exemplify, as the malarial fevers do, the law of periodical excito-secretory action.

Although our own convictions are thus fully committed, viz., *that the neuro-dynamic action is the same in yellow fever and dengue, as we have shown it to be in the other forms of cerebro-spinal fever*, for the reasons above stated, we hesitate to make the formal application of so new a principle to forms which are so unfamiliar to the generality of our profession. Whenever an extended series of observations shall have been made, with the express view of determining this point, we doubt not that yellow fever and dengue will both be found to conform most strictly to all the essential requirements of the law of periodical excito-secretory action. Until such careful investigations are made, a decision, either for, or against, our present surmise, would be both premature and unfair.

The various allied, but heretofore disconnected facts, which, during many years of a somewhat careful study, have occurred *to us*, have finally builded themselves into the consistent and comprehensive outline of febrile pathology, which we have endeavored *to* present in these pages. Beginning the work by a process not entirely our own, we have examined the various simple neuralgiæ, or apyrexiæ, comparing them with the more nearly allied forms, wherein only a few of the phenomena of fever, as heat and congestion, were presented; we have pursued the analogies and affinities through every form of febrile affection, even into the obscurer and more unfamiliar tableaux presented by yellow fever and dengue. By adhering to a strict method of investigation, paying that due respect to the commanding analogies, which the rules of legitimate induction seem fairly to indicate, we have been compelled to recognize the cerebro-spinal system as the only common platform upon which all the varied phenomenal representations of the entire class are displayed for our successful observation and study. It is true that, in the tissues and the fluids, and also in the various chemical changes therein effected, some of the most notable characteristics

of paroxysmal fever are exhibited; but here, the present state of physiology, as well as philosophy, demand that we recognize in these but the results of that neuro-dynamic action, whether direct or reflex, which action is *prompted by, and varies with*, the specific toxæmia of each form of fever.

As a delicate thermometer immersed in a fluid of ever-varying temperature, will manifest, by its elevations and depressions, the thermal changes of the medium, so the nervous system may justly be viewed as the responsive *toximeter* of the blood; immersed in it, bathed by it, permeated in all directions with the blood, the nervous system derives from this vital soil, not only the elements of its growth and recuperation, but also the very energies by which it controls the normal manifestations of life.[1] Should there be introduced into this all-pervading medium, any unusual or toxic element, we know by experiment, that the nervous system, ever responsive to *hæmic* influences, must manifest its presence by unusual or aberrated nervous phenomena. The manifestations must be as multifarious in their expressions, as the powers and functions of the nervous system are multifarious, and its dominion universal; every organ and tissue becomes the scene of their exhibition, and the blood itself, is, in its turn, made to undergo certain profound changes, which are not the *direct* results of the primary intoxication, but of the aberrated neuro-dynamic influence exerted upon it. Daily observations, and many valuable experiments have rendered us familiar with the invariable results of the action of many known agents upon the nervous system, through the blood; we may perhaps legitimately assert, also, that there is a specific toxæmia for each form of febrile disease, but when we would proceed further, and attempt to analyze and detect the peculiar nature of each, or, in other words, what these elements are, and what are the essential differences between them, we find ourselves, at once, outside of the pale of legitimate reasoning, and floundering desperately in a sea of uncertain surmises. For here, to paraphrase another, "the thread of investigation seems suddenly snapped asunder in our hands," leaving us to grope blindly and helplessly in the chaos of speculation.

We are aware that it is one of the *cants* of modern criticism to decry the use of analogies in all processes of inductive reasoning, but to prevent such an error in the present instance, it must be

[1] *Vide* Investigations of M. Brown-Séquard, *Journal de Physiologie.*

remembered, that this investigation from its first to its last page, has been tending towards the establishment of a basis of classification, and moreover, that well founded analogies and recognized affinities constitute the fundamental elements of every system of classification. It is upon these, whether more or less correctly observed, that all classifications in natural history and physical science, as well as all of our present nosological arrangements have been made, and to condemn the discussion of analogies, is therefore to forbid the reconstruction of any branch of science, however carelessly its various materials may have been joined in the first place, and however loosely they may have been hanging together ever since. We do not fear that genuine criticism will ever so far forget itself and the true philosophy of our science, as to condemn the legitimate use of this method of combination; for science is but the proper classification of facts, and classification itself is but the recognition and generalization of *binding analogies;* while to use the words of Montesquieu,[1] who, whenever he had determined the essential nature of things seized upon their relations, and they became for him, their law, "Laws are the necessary *relations* which spring from the nature of things." In the pursuit then of such pervading analogies, we have carefully studied the phenomena of paroxysmal fevers; and while we have found that there are distinguishing features characterizing the various forms of each; yet, that there is a close affinity between them all; and that these essential points of affinity when closely examined, exemplify a common law which has reference to the cerebro-spinal nervous system. This may be termed the *neuro-dynamic law of paroxysmal fevers*, and we would thus formally state it; viz. *That whatever may be the ultimate character of the toxæmia upon which these fevers depend, the cerebro-spinal system is the dynamic source of their phenomena, which are ever presented in strict accordance with the known normal characteristics of either direct or reflex cerebro-spinal nervous action.* This law will be found applicable in all forms of cerebro-spinal fevers—not less to yellow and dengue fever than to the more familiar forms of malarial fever, presenting themselves with the characteristic of many paroxysms.

When now at the end of our examination of these two aberrant epidemic forms of cerebro-spinal fever, we are asked to apply the other law, viz: that of periodical excito-secretory action, with the same severity and consistency to yellow fever and dengue, with

[1] L'Esprit des Lois.

which we were able to apply it to the phenomena of malarial fever, we decline the attempt, more on account of the deficiency of critically observed phenomena on this special point, than of any inherent theoretical difficulty in the execution of such a task. It is true that we here fully recognize the cerebro-spinal system in its aberrated action; it is true also, that here as well as in malarial fever we recognize the power of centrifugal excito-secretory action in its immediate destructive influence upon both, the fluid and tissues. We recognize also, through all the obscurity of the long and fearful *single paroxysm*, marking each of these diseases, that subservience of the cerebro-spinal system to the law of *periodicity*, both in the slight abatements of the fever as well as in the abortive attempts at the second paroxysm; but on the other hand, there are acknowledged obscurities in the phenomena of both these epidemic forms of fever which warn us not to proceed at present, any more deeply into these interpretations. The principal barrier to progress here, is our utter ignorance of the essential nature of their specific primary blood-intoxication. If by an unwonted method of study and an unusual process of induction, we have arrived in our toilsome pathway at the base of a mountain whose top, as yet, is merged in clouds; why, we ask, shall we be urged blindly to clamber over it? We resolutely refuse to try the ascent, in the yet dim twilight of our subject—we wait patiently at the base till the obscurity shall have been cleared by the illumination of that morn, now just dawning over the broad field of hæmatology.

Last year we presented to this Association, a few considerations which were intended only as a programme or plan for the elaboration of the present extensive subject; and now, at the end of this most difficult portion of our labor, we feel that we have, at last, presented only *an outline*. But it will be acknowledged that it is a vast and comprehensive outline, embracing and laying out a vast and comprehensive subject—a subject which, in our opinion, is only equalled in its limits by its paramount and far-reaching importance; for, in all the developments of experimental inquiry, which epoch after epoch must pour into the lap of science, when can we arrive at a period in which the dynamic influence of the nervous system will not be advantageously admitted as giving both character and direction to the phenomena of febrile diseases—indeed, as the very countenance upon whose lineaments the varied expressions of disease are to beam forth, for our recognition and study. In the words of the now almost mythic but still honored

Seneca, we may here prophesy: "The day will come when those things which are now hidden, shall be brought to light, by time and persevering diligence. Our posterity will wonder that we should be so ignorant of that which is so obvious."

GANGLIONIC OR SECRETORY FEVERS.—RÉSUMÉ.

Owing to the wide scope of the subject, we find it impossible to prepare for publication in the present volume of these *Transactions*, that portion of this Report which relates to the various forms of *continued fever*, designated by us "ganglionic or secretory." Not wishing, however, to defer the presentation of that classification which has been evolved from our careful study of them, and from the examination of the cerebro-spinal department of fevers, we omit their special and elaborate consideration in the present place, hoping to offer that discussion on a future occasion.

Although we cannot now give in full, the results of our examination into this, which is really the more simple department of our subject, we yet ask here to append a brief sketch of the neuro-dynamic influences, which we believe to be no less powerfully and profoundly at work in the phenomenal presentations of continued fevers than we have shown to be the case, in the paroxysmal forms.

We have seen, in every form of cerebro-spinal fever which we have examined, that the *nervous system*, under the influence of a toxæmia, which is peculiar to the class, and known only by its results, manifests the febrile phenomena, *in paroxysms*. Certain of these phenomena, as the sensory, the motory and the excito-*motory*, *begin* and *end* in the cerebro-spinal system; while there are others which manifest a widely extended and complicated *secretory* action, with its chemical, thermal and circulatory changes, in all the fluids and tissues throughout the system. These are governed by the ganglionic system of nerves, and the method of their production, as we have shown, is by *excito-secretory* action.—Without the excito-secretory function, febrile manifestations, such as chemical change, thermal change, aberrated circulation, secretion and nutrition, *can never exist in cerebro-spinal* neuroses; we may have paroxysms of neuralgia without excito-secretory action, but never a paroxysm of cerebro-spinal *fever*. *Febrile action*, then, *in cerebro-spinal fever*, *is excito-secretory action*, and to characterize paroxysmal fevers by a title applied in strict accordance with the special neuro-dynamic influence

immediately underlying their phenomena, they should be designated "excito-secretory febrile neuroses." The attribute of *periodicity* would be, necessarily, involved in the term, as excito-secretory action, in these instances, is *initiated* by cerebro-spinal action which ever contemplates periodicity as its normal method.

Now, when we come to consider *the continued fevers*, we find that the phenomena characterizing the class, depend equally upon toxic conditions of the blood which, although perhaps somewhat more definable, are fully as inscrutable as the poisons of malarial fever, yellow fever and dengue. These poisons appear to act *directly* upon the ganglionic system and originate the train of febrile phenomena, *without the intervention of the excito-secretory function, or any primary dynamic influence from the cerebro-spinal nerves or centres whatever.* Hence, in these forms, there are observed no paroxysmal exacerbations which can be said to be intrinsic to the disease. In scarlatina, rubeola and the typhoidal fevers, the cerebro-spinal system cannot escape being more or less *impressed* by the perturbation primarily produced in the ganglionic system—we hence see it manifesting this amount of impression, which is secondary, in its own *periodical* manner, giving rise to the variations frequently seen in those affections, but these are no part of the disease, for if these exacerbations are prevented by quinine, the regular train of scarlatinal or rubeolar phenomena are not by this means interrupted. These exacerbations, however, when they occur, should be silenced by quinine, as the cerebro-spinal system often becomes "a most powerful ally" to the ganglionic, in its destructive modifications of the fluids and tissues under the circumstances here mentioned.

Under proposition third, of our former communication,[1] will be found embodied most of the distinguishing characteristics of the two departments of fever. We close the present sketch with a condensed statement of the same in this place.

Cerebro-spinal fevers are all *paroxysmal*, the secretions and nutrition being only *secondarily* affected, while the entire class which we have arranged under the head of ganglionic fevers, are all *continued;* the secretions and nutrition being *primarily* affected. The one essential diagnostic element of continued fevers is, that they can be recognized by pathologists, as *manifestations of disease through the ganglionic nervous system*—all of them are marked by fever of a continued or non-paroxysmal character—all present marked *pri-*

[1] See Transactions, vol. x., May, 1857, p. 457.

mary aberrations in the functions of nutrition and secretion, and each has, in one degree or another, its own peculiar eruptive character.

With the above brief résumé, the terms of our classification, as they relate to the continued forms of fever, will be readily comprehended by the reader.

THE CLASSIFICATION OF FEBRILE DISEASES IN ACCORDANCE WITH THE NEURO-DYNAMIC ORIGIN OF THEIR PHENOMENA.

As classification, in one form or another, is, in reality, the end of every inquiry into the nature of things, so, in the present examination, have we steadily tended towards a systematic arrangement. To evolve the fixed characters of the *kinds* of those things, about which this discussion is conversant, has been the object and much desired end of *our* labor; for, without these fixed characters, general propositions concerning them would not have been possible.[1]

An account of the phenomena of fever, as has been said in regard to an entirely different subject,[2] "is a history of the highest interest, filled with curious episodes, most difficult to relate." We can truly say that we have given but an outline of this history, but as the *details* of it are in the minds and daily experience of every practitioner of medicine, we may confidently trust to those sources, for the abundant supply of our deficiency.

The facts of no branch of medical science ever seemed more to require that *some common principle* should be made the basis of their systematic arrangement, than the confused and complex phenomena of febrile diseases do at the present time. Most of our present classifications rest upon a grouping of the observed phenomena of fevers, upon a principle which penetrates no deeper than the external appearances, which are the *results* of neuro-dynamic action, while *the force which has wrought those changes*, has generally been passed by, as a casual complication of the morbid condition, and scarcely ever allowed that prominence which would entitle it to be termed, a *basis of classification*. The ordinary traits of fever serve very well to mark specific, and even generic differences presented by individuals of the class; but when we would use them as the means of a com-

[1] Inductive Sciences, vol. ii. p. 314.

[2] M. Agassiz's Report on Fossil Fish discovered in England. British Association Reports, 1835, p. 72.

prehensive and consistent arrangement, they fail entirely to reach the desired end. We find, when we would build a system by them, that the fabric falls to pieces on account of the uncongenial nature of the materials, and, instead of one unique and symmetrical structure, embodying every variety of suitable material in its consolidated whole, we are forced to construct many *minor* edifices, each one distinct and unkindred to the rest.

There seem to be but two sources from which we may hope to evolve a common principle which could serve as a basis of classification in febrile diseases. These are: 1st. *The blood;* and 2d. *The nervous system.*

The study of the blood presents two distinct objects, the attainment of either of which might furnish the desideratum: 1st. The toxic principle primarily initiating the morbid actions, *i. e.*, the intoxicating element; and secondly, the morbid changes in that fluid characteristic of these actions. Upon one or both of these principles, fevers, and perhaps all other diseases, will one day, doubtless, be classified; but as we have endeavored to show, both of them are, at present, beyond the reach of our appliances for investigation. When we would interrogate here, the oracle answers in enigmas. Whenever, in our attempts at elucidation, we carry the febrile phenomena to the blood alone, we carry them to confusion.

The nervous system, as we have seen, is scarcely less universal in its relations to the animal economy and its phenomenal representations, than the blood; and though in the adoption of it as the recognized origin of morbid phenomena, we are at least one remove from the real source of their known production, still, in its established facts, we find all that is necessary for a reliable and philosophic association of the phenomena of fevers. Our knowledge of the nervous system, though by no means complete, is yet consistent; investigation has advanced sufficiently far, to have imposed, upon subsequent developments, a sort of *necessity* in their conformity to what has already been evolved; and therefore the liability to any radical change in the principles upon which such a classification is based, is not seriously to be apprehended. Besides, the nervous system is every day becoming more and more the basis of classification in all the organical sciences, in the subjects of which, it forms a part. From the days of Aristotle to the present time, no system of classification has proved so successful in zoology as that based on the nervous system. In nosology, no less than in zoology, shall we find it a reliable and enduring basis of arrangement, for, as in all

classes of animals, however wide may be the range of their faculties, and however diverse their habits, nearly the same essential constitution of nervous matter is ever the dynamic source of that power which initiates and co-ordinates their special acts, so in all the normal or abnormal phenomena presented in the human system, *neuro-dynamics* are never found to contradict the developed and often asserted principles of their action. However aberrated or distorted and misdirected, in the various by-ways of reflex action, they can be still recognized, as coming from their original source, the nervous system, as a beam of light, however reflected and broken, still betrays the presence of the sun.

The nervous system, however, has not always been the legible register of morbific influence that it now is. The correlation of its various parts has not been fully understood until a comparatively recent date, and reflex action half interpreted by the term "sympathy" has long blindfolded our vision, in recognizing its phenomena. Sir Charles Bell, in the discovery of sensory and motor nerves, first opened the way to our illumination; and the late Dr. Marshall Hall, in the establishment of excito-motory action, rent the veil which darkened many a shining truth, and inaugurated a course of investigation, the daily developments of which will long and truly record that, though "he has ceased from his labors, his works do follow him." His numerous and extensive applications of the doctrine of excito-motory action, firmly established the *principle* of reflex nervous action, which, like Sir Charles Bell's doctrine of sensitive and motor nerves,[1] on which it is based, had long before, to use the apt language of another,[2] "been adumbrated," but never so clearly enunciated as to gain a position among the established doctrines of science. The general principle of reflex nervous action once established, in 1837, it has been applied in every possible relation of the nervous system, even to the correlating of the different portions of the brain itself, in the manifestation of intellectual phenomena.[3] In another manner, this

[1] Erasistratus and Herophilus lived about 300 years B. C. As Rufus of Ephesus informs us, they both distinguished the nerves into two sorts, those which are the organs of sensation and those which are the organs of motion; thus, αισθητικα και προαιρετικα νευρα, nerves of sensation and volition.—See *History of Medicine*, by William Hamilton, M. B. (afterwards Sir William), vol. i. p. 86. London, 1831.

[2] Prof. William K. Bowling, Senior Editor of Nashville Journ. of Med. and Surg.

[3] "Just as the spinal centres uncontrolled produce convulsions, so do the lower encephalic centres uncontrolled, produce insanity, which may be denominated the

reflex action has been applied in the co-ordination of similar relations between the cerebro-spinal and ganglionic systems, so that every obscurity may be said to have been in a great degree lessened, which has heretofore prevented our full recognition of *the dynamics* of febrile phenomena, however indirectly they may be presented.

Our classification of febrile neuroses is based upon the principles educed from the examination of the phenomena of fevers in connection with the dynamic influence of the nervous system. In our arrangement of these neuroses, we found it impossible to separate the non-febrile or apyrexic from the febrile or pyrexic, without much disadvantage to our arrangement; for, as we have seen in our examination of them, they are indissolubly connected in nature; we have, therefore, *tabulated* the apyrexiæ along with the pyrexiæ, not bestowing upon them, however, the same minuteness of description. The association of the two classes renders the distinctive characteristics of the pyrexiæ, which are the only *fevers*, more prominent, while at the same time it gives to our synopsis, the advantage of presenting all the more prominent members of an entire class of diseases. "With the process of *classing*," says one who has considered deeply, not only the course, but the philosophy of all inductive science,[1] "is joined the process of *naming;* for names imply classification." Such is doubtless the case, and without a well-adjusted nomenclature, "we cannot arrive at that precise, certain, and systematic knowledge which we seek;" but experience has shown, that in many departments of science, but pre-eminently so, in the ancient science of medicine, the substitution of new terms, however appropriate, for old and familiar ones, has ever been attended with many disadvantages. Many old words which, in the first instance, enveloped erroneous ideas, have, in the course of time, been corrected in the mind of those who use them, and have become at the present day, the current counters of thoughts, entirely dissimilar from what they at first represented. Yet it cannot be denied, that science has been much retarded during the whole epochs in which it has sometimes occupied itself, in thus correcting the signification of a term, while its own symmetry has been warped by the inaccuracy of its nomenclature;

convulsions of the mind."—Prof. Daniel F. Wright, Review of Bucknill and Tuke on Insanity. *Nashville Monthly Rec. of Med. and Phys. Science*, vol. i. No. 2.

[1] William Whewell, D. D., Master of Trinity College, Cambridge.

"for it is impossible that the vesture of a thought should not have influence upon the thought itself."[1] We have, in our synopsis, notwithstanding the above considerations, been very sparing, as will be seen, of the introduction of new terms. With the exception of those applied to the two grand departments of neuroses, viz., "cerebro-spinal" and "ganglionic or secretory" (and the first of these is not by any means unfamiliar even in the connection we give it), we have retained old and familiar terms for every object mentioned. Indeed, for the terms "pyrexia" and "apyrexia," so seldom used by modern writers, except among the *synonyms*, we would apologize, but that their applicability too well, in our mind, bespeaks their acceptance. Our basis of classification being founded rather upon the analogous nature of the things classified, than dependent upon those arbitrary characteristics indicated by the names of diseases, we have found but little difficulty in retaining the established nomenclature, even while we were associating the several members of the class under relations, we believe, never before fully recognized, and upon a principle never before so extensively applied as to constitute a special basis for a nosological arrangement of fevers.

So far from braving criticism, we do not hesitate to say, that we expect our arrangement of febrile diseases *to be much improved by* the friendly suggestions of those to whose judicious review it will hereafter be submitted. For although we feel much confidence that the one comprehensive and clear idea of *neuro-dynamic action*, upon which our classification is based, is fully competent to bind febrile diseases together in a consistent and philosophic association; still, it can scarcely be hoped that we should, on this first application of it, have been able to seize upon that trait of each individual member, which presents the most prominent analogy with the others of the same class. Again, many diseases which have been overlooked by us, especially among the apyrexic neuroses, will doubtless be found appropriately to fall in, under one or other of the various generic or specific heads evolved by the principles of our classification. Such amendments as these, our arrangement would most certainly, advantageously receive. To alter it further, would be to replace it by another basis, the acceptance or rejection of which will be, not with us, but with the profession at large.

[1] Cousin, History of Modern Philosophy.

BASIS FOR THE CLASSIFICATION OF THE NEUROSES.

The neuroses are divided into two grand departments, on a principle which has reference to the two grand divisions of the nervous system, viz., firstly, the cerebro-spinal, and secondly, the ganglionic or secretory.

PROPOSITION I. THE CEREBRO-SPINAL NEUROSES only become cerebro-spinal *febrile* neuroses, or cerebro-spinal *fevers*, when under their influence, the cerebro-spinal system becomes the *excitor* of the various functions of the ganglionic system *by excito-secretory action;* giving rise to altered circulation, nutrition, and secretion, to chemical change in the fluids and tissues, to thermal change, and to changes in the constitution of the blood. Otherwise, these neuroses are more properly designated, simple neuralgiæ, spasmi, convulsiones, &c.

PROPOSITION II. THE GANGLIONIC OR SECRETORY NEUROSES, only become ganglionic *febrile* neuroses or ganglionic *fevers*, when, under their influence, the ganglionic system becomes, *by direct secretory action*, the dynamic source of the chemical and other changes above mentioned. Otherwise, they are simple profluvia, stases, dropsies, &c.

Remarks.—Increased temperature, the great *characteristic* of true febrile action, has very properly been made the *criterion* of the genuineness of this action.[1] Increased action of the heart with congestion or stasis in the capillary circulation, may exist without increased heat. Increased heat we have seen, denotes chemical change, for without chemical change there is no animal heat, whether normal or abnormal, originating in the system. These chemical changes and other characteristics of febrile action occur in the tissues and organs of the body, under a neuro-dynamic influence originating, either *directly* from the ganglionic system as in continued fevers, where they can manifest little or no paroxysm; or on the other hand, they may occur under a neuro-dynamic influence transmitted to the organs and tissues by *excito-secretory action* from the cerebro-spinal system, when they are invariably paroxysmal.

We have seen that *the production of fever involves an impression*

[1] See Investigations on Malarial Fever, by Joseph Jones, M. D.

upon the nervous system. This impression may be made centrally upon one or more of the nervous centres, or it may be made peripherally, as upon the distributed branches pertaining to these centres—the nerves. When the impression is made centrally, it is generally *by the application of some poison through the medium of the blood*, as in malarial fever, yellow fever, &c., among the cerebro-spinal, or, as in typhoid fever, scarlatina, rubeola, &c., among the ganglionic class. When the source of the fever is in the blood, which is most generally the case, not only the nervous centres, but *every portion of the nerves* also, are probably impressed by the toxæmic influence. But we have seen that an impression may be made *externally*, either along the course, or to the sentient extremities of the nerves, which is *not* toxæmic, but *mechanical*, and yet, which may give rise to all the phenomena of fever. This has been illustrated in the cases of wounds to the surface, and other injuries heretofore mentioned. In those cases, the production of the febrile phenomena is by a *true reflex excito-secretory action*, the peripheral impression being carried, by the sentient nerve, as the *excitor to the* spinal centre, the polarity of which is probably increased, and from thence it is transmitted to the ganglionic centres, and to the branches distributed in the tissues. In this way, the neuro-dynamic action, necessary for the production of the chemical and other changes, is both originated and becomes efficient. All primary traumatic fever[1] is of this character, and is, therefore, necessarily paroxysmal. That this form of traumatic fever is local, or confined entirely to a particular region, as to a single limb, is easily explained: thus, a sensitive nerve being wounded or irritated, it transmits the irritation to the cerebro-spinal centre, it is reflected thence upon that portion of the ganglionic system with which the irritated *excitor* is more specially related, viz: those branches which control the circulation, &c., of the part in question; and hence we have in the tissues, *locally* presented, all the manifestations of fever, as increased circulation, increased chemical change and elevated temperature. The phrase *ubi irritatio, ibi fluxus*, is a petitio principii, which *evades* the problem of the local phenomena thus excited, while the function of *reflex* excito-secretory action fully *explains* it. Although general

[1] We have, on a former page, discriminated between this form of fever attending wounds and the low irritative or hectic fever, which is of a secondary character, and occurs from the degeneration of the tissues, and the formation of septic elements in the blood; sometimes from the absorption of pus, or the retention of elements which should have been eliminated.

fever is sometimes thus excited, by a single *point* of irritation, still the phenomena are more frequently restricted to a particular *set* of correlated *excitor* and *ganglionic* nerves, and then the functional manifestations are necessarily local.

The ganglionic fevers differ from the cerebro-spinal, in the fact that they seldom or never originate elsewhere than in the blood, and they are, therefore, more frequently termed *blood diseases* than the former class.

Although we have carefully avoided any attempt at an investigation of the *nature of the cause* of fever, there are certain propositions which have met such general acceptance, that they may be regarded as forming a part of the established truths of science. Firstly, that the cause of paroxysmal fever is of a different nature from that producing the continued forms; the one being generally considered of a vegetable origin, and the other to be derived from animal sources. Secondly, that, "in all defects of the blood, each particle must, under all circumstances, participate—that there is no partial disease of the fluids." And thirdly, "where there is an abnormal condition of the blood, the nourishment of the solid parts *suffers exactly in proportion to its physiological relation to the individual ingredients of the blood.*"[1]

Without attempting to speculate upon the nature of the cause in either case, we may recognize that, when the entire mass of the blood is vitiated by the malarious poison, of whatever nature it may be, that the physiological relations, or, so to speak, affinities, which the cerebro-spinal system sustains to *this* individual ingredient of the blood, render it susceptible to its action, and cause it to manifest the phenomena of paroxysmal fever; while the ganglionic system is not primarily affected, because its physiological relations are different. But, on the other hand, on the introduction of a scarlatinous, rubeolous, or typhous poison into the blood, the ganglionic system suffers more particularly, because *its* physiological relations or susceptibilities to the individual ingredient, *now* render it liable, and thus the two nervous systems, in each case, suffer exactly in proportion to this physiological relation. This view of the subject, is not without corroboration in our knowledge of the observed action of known agents; strychnine, when taken into the system, or introduced into the blood, impresses the *cerebro-spinal* system almost exclusively, which impression is manifested in tetanic

[1] Henlé, General Pathology, p. 181.

convulsions; while belladonna, as we have seen, has such physiological relations to the *ganglionic* system that it often so modifies the cutaneous capillary circulation as to produce an efflorescence almost identical with the scarlatinal eruption. Without attempting to define their nature, we may again infer, that each of the *febrific poisons*, besides having physiological relations which determine *classes* of them, to one or other of the nervous systems, has its own *specific* mode of action upon that system, and causes it to manifest blood intoxication, after its own specific *method*, yet in strict accordance with the functional habitudes of that department of the nervous system upon which it is operating. Thus the variolous virus so aberrates the action of the ganglionic system that, under its influence, the phenomena of smallpox are manifested; while, under the action of the scarlatinal, rubeolous, or typhous poisons, we have scarlet fever, measles, or the typhoidal fevers, each one, equally, but an expression, so to speak, of the ganglionic nervous system, but varying with the *specific nature of the stimuli* by which its dynamic action is originated.

Whether there is in the malarious poisons and in the poisons of yellow fever and dengue, this same diversity of nature, which causes them to incite the cerebro-spinal system to the manifestation of its febrile phenomena in such a manner as to present the specific and generic differences, marked by, *many* quotidian, tertian or quartan paroxysms, in the one case, and by, a *single* protracted paroxysm in the two others, we may surmise, but we cannot at present pretend to decide. All such considerations have so repeatedly and for so long a time, been attended by *failure*, that they can scarcely be classed, even as yet, among the subjects of legitimate investigation; and, beyond the acknowledged fact of the *existence* of such principles, as recognized in their results, they certainly do not form a very reliable part of our inductive reasoning. They belong, not yet, to the established and incorporated data of medical science, but to the still unsubdued, and therefore, barren field of *medical speculation*.—Not upon such, but upon the familiar and clearly observed morbid phenomena, legitimately traced to their respective neurodynamic sources, as concisely embodied in Propositions I. and II. of our Basis,[1] have we endeavored to found our classification.

However consistent and comprehensive may be the basis of any classification, the tabular arrangement of its details is ever an

[1] See page 711.

object upon which much time and labor are to be expended. The association of a large number of objects under *classes*, is comparatively an easy work; for, classes exist in nature already formed, and, with that tendency of the human mind to group objects together, they are easily discovered—they have not to be invented.[1] On the other hand, the qualities which associate genera into orders, and species into genera, are of a more recondite nature, and require the most careful study of the *individual forms*, to secure a reliable and consistent synopsis. We are said to "*bind things together in bundles*, that we may shorten our way to knowledge;"[2] but unless they are bound together upon a principle which is, in every respect, legitimate, we do not facilitate our *progress*—we only smoothe the road to *error*. Without more deliberation and a particular study of individual diseases, we are unwilling therefore to attempt more at present, than the *sketch of a plan* for the future tabulation of the neuroses. That portion which refers to *febrile diseases* is more complete, though not perfect, and it will be remembered that *their* discussion and arrangement are all that has been attempted in the foregoing communication.

TABULAR ARRANGEMENT.

NEUROSES.—Diseases in which any portion of the nervous system may be recognized as the *primary dynamic source of either, their functional manifestations, or their structural changes.*

CLASS I. CEREBRO-SPINAL NEUROSES.—All paroxysmal—The cerebro-spinal system primarily affected—Produced by causes generally, of an atmospheric origin introduced into the blood—May also be excited by any irritation whether peripheral or central, as urethral irritation, wounds, furuncles, &c., and, as in case of injuries in the nervous centres.

Order 1. CEREBRO-SPINAL APYREXIÆ.—Little or no aberration in the chemical changes going on in the tissues—Altered nutrition and secretion rarely manifested—The characteristic of this order is the *absence of excito-secretory action* as a general thing, though it is occasionally manifested in each one of them.

Genus 1. *Neuralgiæ*—Affecting the sensory portion of the cerebro-spinal system; these have been variously divided in accordance with their location, character, &c. &c.

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[1] Dr. M'Cosh, Typical Forms and Special Ends in Creation, p. 461.

[2] Locke.

Genus 2. *Spasmi*—Affecting the motory or excito-motory portion of the cerebro-spinal system. These are specifically arranged, also, in accordance with their characters and locations, as—

Species 1. *General Convulsions.*

a. Tetanus.

b. Epilepsy, &c.

Species 2. *Partial Convulsive Affections.*

a. Pertussis.
b. Spasmodic Croup.
c. Spasmodic Asthma.

} More frequently marked by excito-secretory action[1] in one form or another, than the rest of this genus.

Order 2. CEREBRO-SPINAL PYREXIÆ, or CEREBRO-SPINAL FEVERS.—The characteristic of this order is, that they manifest strikingly the law of *periodical excito-secretory action* in every possible form; as by periodic aberrations in the secretions, circulation, and nutrition; in the chemical changes, and, consequently, in the changes of animal temperature. They are, *par excellence*, the *excito-secretory* neuroses—Allied to the cerebro-spinal apyrexiæ, by pain and convulsive symptoms.

Genus 1. *Cerebro-spinal Fevers of many Paroxysms.*—Generally endemic—The paroxysms or exacerbations continue to return at stated intervals, unless prevented by appropriate therapeutic measures—The effect of each paroxysm is to produce, or to increase congestions in one or more of the organs by excito-secretory action; by frequent repetition, these congestions become true engorgements. —Both the congestions and engorgements permanently derange the functions of the organs in which they occur—Hæmatopoiesis is interrupted and deranged, the patient becoming in time œdematous and pale. Did we consult these local congestions, these fevers might be arranged in such a manner as would respect the popular, but rather superficial and objectional, distinction of brain fever, lung fever, bilious fever, intestinal[2] gastric, &c. A marked characteristic of the genus is, also, their tendency to hebdomadal periodic relapses.

Species 1. *Intermittent Fever.*—*Complete* subsidence of febrile symptoms during the intervals between *paroxysms.*

Varieties.—1. Quotidian.
2. Tertian.
3. Quartan, &c.

Species 2. *Remittent Fever.*—*Partial* subsidence of febrile symptoms during the intervals between *exacerbations.*

Varieties.—1. Quotidian.
2. Tertian.
3. Quartan, &c.

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[1] Pertussal glucosuria is a true excito-secretory result, the excitor being the pneumogastric nerve.

[2] For the *discrimination* of these phenomena as *complications*, see *Southern Med. and Surgical Journal*, vol. ii. old series, p. 337. "Remarks on the Pathology and Treatment of Bilious Fever," read before the Medical Society of Augusta, by L. A. Dugas, M. D., Professor of Anatomy in the Medical College of Georgia, 1837.

APPENDIX TO THIS GENUS.—These may be either intermittent or remittent, or they may be epidemic, endemic, or sporadic.

1. Pneumonia.
2. Pleuro-pneumonia.
3. Influenza, Pharyngitis, &c.
4. Cholera Infantum.
5. Dysentery, &c.

Genus 2. *Cerebro-spinal Fevers of a Single Paroxysm.*—Nearly always epidemic—Closely allied to malarial fever, and to the apyrexiæ, by pain, convulsive symptoms, &c.—Far transcend the malarial forms in the destructive changes wrought in the blood and in the tissues of the organs—Length of paroxysm, from twelve to seventy-two hours—The paroxysm does not repeat itself after having entirely subsided—Often marked by remissions.

Species 1. *Yellow Fever.*

Varieties unknown, or not fully determined.

Species 2. *Dengue Fever.*

Varieties unknown, or not fully determined.

CLASS II. GANGLIONIC OR SECRETORY NEUROSES.—All of a continued or non-paroxysmal character—All refer *directly* to the ganglionic system as the dynamic source of the phenomena—all of them, whether apyrexic or pyrexic, are produced by causes which can generally be recognized as being of a specific nature—Some of them are contagious, others not so—They are either epidemic or endemic.

Order 1. GANGLIONIC APYREXIÆ.—The interstitial chemical changes giving rise to increased animal temperature, not manifested.

Species 1. *Simple Diarrhœa*—Sporadic and Endemic.

Species 2. *Asiatic Cholera*—Epidemic.

Order 2. GANGLIONIC PYREXIÆ, OR GANGLIONIC FEVERS.—As their name indicates, the characteristics of fever are well marked—Interstitial chemical changes abundant, resulting in high temperature. Each one of this order is self-limited in its duration.

Genus 1. *Typhoidal Fevers.*

Species 1. *Typhoid Fever.*

Variety—1. Thoracic form.
2. Abdominal form, &c.

Species 2. *Typhus Fever.*

Varieties not arranged.

Genus 2. *Exanthematous Fevers.*

Examples.—1. Scarlatina.
2. Rubeola.
3. Variola, &c. &c.

In the foregoing Report on the Nervous System in Febrile Diseases, it has doubtless been observed that, brief as our examination of the various phenomena has necessarily been, a portion of our space has been occupied in retrospects, which have given to the discussion the aspect somewhat, of an historical review of our subject. This result, it will be admitted, was almost unavoidable, as, from the very nature of the investigation, it constantly became necessary to examine the opinions of a large number whose names and labors, though recorded in relation generally with other subjects, were yet indissolubly connected with important portions of ours. Besides, it is an acknowledged fact that, "in the *history of opinion* in almost any branch of study, is often to be found the true philosophy of that particular department"—often warped and mixed with error, it is true, often weakened by contradictory statements and false conclusions, but, nevertheless, much of the truth is there, and laborious reasoning may distil it over into the vessels of real science. It was only by collecting our materials from sources the most diverse, and often the most unusual, that we have been able to find full data for generalizations, which from the nature of the subjects to which they refer, are so comprehensive; and which, at the same time, have imposed upon them, so strict a conformity to such a variety of conditions. The interpretation of the *complex* phenomena of fever, originating from causes, the nature of which is confessedly unknown, the tracing of these phenomena *to their* various dynamic sources, and their proper discrimination (embarrassed as it is by the many obscurities of both direct and reflex nervous action), so as to establish upon them a basis of classification, imposes a task, the very difficulty of which demands the patience and indulgence of even the most exacting among those who may take the trouble to give it any consideration.

During our discussion of the subject of paroxysmal fever, we had occasion, so frequently, to point to the more direct action of the cerebro-spinal *centres* upon the organs, through the ganglionic system, and this was often done in such close relation with that more intricate though fully as well established process, which we have termed *reflex excito-secretory action*, that, at these times, we have found it convenient to designate the *two* processes by the *single* term, appropriate to both—excito-secretory action. In a former communication to this Association,[1] we discriminated carefully *be-*

[1] The Excito-Secretory System of Nerves, in its Relations to Physiology and Pathology, Transactions, vol. x., 1857.

tween these two methods in which excito-secretory action may be originated; and in the course of the present paper, we have quoted freely from Henle and older writers, as well as from Drs. Claude Bernard and Brown-Séquard, many *instances* of the production of both altered function and changed tissue, by irritations made in the cerebro-spinal centres; but inasmuch as since then, we have observed some *ingenuous* misapprehension on this point, we here formally reaffirm the difference between the two kinds of acts, which we have termed excito-secretory. The one is the result of an impression made upon a cerebro-spinal *centre*, from which impression or irritation, the ganglionic system is excited to the performance of all, or any one, of its various kinds of acts. The other, which we have termed reflex excito-secretory, is, as we have said, a more recondite process, and comprehends, not only a cerebro-spinal centre, but also a sensitive cerebro-spinal *nerve*, implanted into that centre, which, having received the *peripheral* impression, acts *centripetally* in transmitting it *to* the cerebro-spinal centre, from which point, the two excito-secretory processes present no difference in their mode of manifestation.

Isolated and unclassified *facts* illustrating the general notion of the influence of the cerebro-spinal nervous *centres* upon the organs, have been occasionally referred to for a long time, in various relations in the explication of morbid phenomena; but, as we have seen,[1] even these views have never exerted much influence in pathology, nor ever became at all prominent in physiology. They certainly suffered much neglect, and being denied by the best authorities, were seldom ever appealed to in medical investigations. But on the establishment of the truth of the more comprehensive doctrine of reflex excito-secretory action, these scattered facts and older views gain a new importance by the clear illumination of the present light, which this more recent function is enabled to reflect *back* upon them, and they now lend their aid in the elucidation of phenomena which before, did not come within their scope.

The awakening and entire reconstruction of an old and imper-

[1] See page 605, quotation from Copeland's Dictionary of Practical Medicine. The cause of the failure of these views, was the non-existence or rather non-establishment at the time of their suggestion, of the *science* of reflex nervous action. "Their success only began to be possible" on Dr. Marshall Hall's announcement of excito-motory action in 1837. This is the acknowledged *epoch* of the discovery of reflex nervous action. Former *facts* were but the *prelude* to that epoch. See History of Discovery, everywhere.

fect doctrine, by the subsequent independent origination of a new and more complete one, is certainly not without precedent in the history of inductive science. In our own department, Sir Charles Bell's discovery of sensitive and motor nerves, reminded us that Herophilus had *surmised* the same, in the remote and almost forgotten past; yet, Sir Charles Bell's distinct and clear enunciation of the two functions was the starting-point of a new epoch in the history of physiology. Even the sublime and immeasurable law of gravitation was darkly foreshadowed in the epicycular theory of Hipparchus, ages before.

It was the observation of Mersenne,[1] that in a number of cords stretched with an unequal degree of tension, only those will respond to another cord sounded near them, which happen to be strung to a nearly similar note; otherwise, unless skilfully touched themselves, they never yield harmonious strains. So these older *facts* of science—observed, and accurately recorded, long ago, they have lain still and silent, like the carefully strung, but unwaked cords of a neglected harp—the dust of ages has accumulated upon them; no hand disturbs, no kindred note calls forth an answering vibration—motionless and mute they sleep, yet holding a potential, though unstirred melody. But now, a kindred note *is* sounded *very near them*, in the distinct and clear enunciation of some *general principle*—and they awake—slowly at first, and in dull vibrations, then—in a confused and jarring clamor of discord; but, as the dust becomes fully shaken off, by the constant sounding of the appealing note, their response becomes clearer and more genial, till, as with Newton's law, they all together swell into an anthem, which, blending with a still yet higher harmony, makes up that which binds earth to heaven—THE HARMONY OF INFINITE TRUTH.

[1] 1636.

REPORT

ON

MORAL INSANITY IN ITS RELATIONS TO MEDICAL JURISPRUDENCE.

BY

D. MEREDITH REESE, M. D., LL. D., ETC.,
OF NEW YORK.

REPORT ON MORAL INSANITY.

THERE is no single topic in the whole range of medical inquiry, which has so strong claims upon the earnest attention and painstaking investigation of our profession, as the subject of *Insanity* in the various phases it assumes, all of which are included under the generic name. Happily for us, and for the interests of humanity, many of the mightiest minds which have ever been enrolled among physicians, in our own, and other countries, and in each succeeding generation, have consecrated their genius and intellect to this exclusive field of research. And hence, confessedly obscure as are the morbid phenomena of mind, in their etiology and causation, when latent, or even overt disease has begun its ravages upon the brain; yet there is no department of organic or functional malady to which our race is liable, upon which greater light has been thrown, or greater improvements made, than in the prophylaxis, diagnosis, therapeutics, and moral management of insanity. The present century, especially, has been signalized by an entire revolution in the theory and practice in this department, and honorable to our profession, and challenging the admiration of the world, for the philanthropic results which have followed.

It is not our province or purpose, however, to discuss this general subject of Medical Psychology, which, in its varied and multiform aspects, would be a task, indeed, for any but an acknowledged expert, who has made the selection of this department for special study and exclusive practice, and even he would require longer time and an ampler space than has been awarded to the author of the present paper, which must, of necessity, be brief.

"Moral insanity" is the theme which has been assigned to us, and to this alone our inquiries and observations will be directed. And with the view to greater perspicuity, we propose to consider and discuss the following questions, viz:—

I. What is "moral insanity," as defined by those who have introduced the term into our medical nomenclature, and who seek to connect it with our jurisprudence, and obtain its recognition by our tribunals of morals and law?

II. Wherein does "moral insanity" differ from "moral depravity," in any case in which "intellectual insanity" does not coexist.

III. If insanity, whether intellectual or moral, be the result of physical disease in the brain, either functional or structural, are not the distinctions into partial or monomaniacal insanity, into mental and moral, wholly fabulous and visionary?"

IV. In deciding all questions of responsibility and punishability, ought not the only distinction to be between *sane* and *insane?* The responsibility and "punishability" of the insane is prohibited by every code of law and morals, whether Divine or human. The *sane*, and none else, are responsible and amenable to punishment; while the contrary may be infallibly predicated of the *insane*, whether the insanity be physical, intellectual, or moral.

I. "MORAL INSANITY," is distinctly defined by the phrase of Pinel, to be "*Mania sine delirio*," or by that of Esquirol, "Mania instinctive;" or by Prichard's definition, "A disorder of the moral affections and propensities, without any symptoms of illusion or error impressed on the understanding," and as expressed in their works—"*A perversion of the natural feelings, affections, inclinations, temper, habits, moral dispositions, or impulses, without any illusion or hallucination, the intellectual faculties being more or less weakened or impaired.*" Prichard, and the disciples of Gall, Spurzheim, and Combe, employ this term "Moral Insanity," as do also among our own countrymen, Drs. Ray, Brigham, &c., all of them deriving their views from the peculiar teachings of phrenology, and all concurring in recognizing a distinct species of insanity, without delirium, without illusion or hallucination, and without any perceptible defect in the understanding or intellect, but manifesting itself only by a depraved perversion of the instincts and moral powers, whereby the power of self-control is alleged to be lost, and the individual hence ceases to be responsible. Dr. Spurzheim uses the term "*irresistibility*" as characterizing this form of insanity, signifying that the insane or depraved impulses are absolutely beyond successful resistance, and hence infers exemption from the obligations of law, and equal exemption from the penalties of its violation. All this

is claimed in the absence of any perceptible aberration of the intellect, or alienation of the mental faculties, which are regarded as wholly distinct from the moral powers.

This phrenological distinction in the philosophy of mind, which recognizes the instincts, moral propensities, and intellectual faculties, as dependent upon certain separate portions of the brain, of which these several powers are the functions, and claiming that either of these functions of mind may be morbidly affected without the others being disturbed, has led to the whole theory of "moral insanity," as now propounded in some of our books, and taught in some of our schools. For, if the mind itself be regarded as an individuality, and the brain—its organ, or instrument—a unit, through which all the various phenomena of mind are manifested, the idea of separating the intellect from the moral or instinctive faculties, and supposing one to be sound, and the other unsound, both being the developments of the same mind, would never have been entertained. It is only on the theory that the brain is a congeries of organs, each of which has its appropriate function, and severally developing instinctive, moral, or intellectual results; and on the still bolder hypothesis that the organs of each separate function may be arbitrarily mapped out, or designated by the science, that this conception of moral insanity could ever have been engendered. Indeed, to render its existence plausible, even on this basis, it would seem to be necessary to wander into still wilder speculations, and either question the existence of mind as a distinctive and immaterial being, and hold—as many of this school teach—that all the attributes, mental and moral, are mere functions of the cerebrum and cerebellum, the cortical, cineritious, or medullary portions of the brain; or else to adopt the doctrine of the duality of the mind, and run into materialism outright in this direction.

There would seem to be a tendency in these investigations, looking to metaphysics and psychology, to lead to mysticism, if not essential heresy. All who employ the terms "Diseases of the Mind," conceding that insanity, in any form, is thus accurately defined, most obviously deny the immateriality of the mind, and its immortality as well, for, if liable to disease, the mind is, *ex necessitate rei*, liable to death.

But there is no occasion for dwelling upon these fine-spun subtleties on a subject, which, however difficult, is only rendered more obscure by this "philosophy, falsely so called." The *brain* is now recognized as the organ or instrument of the mind, in every en-

lightened creed, either among jurists, theologians, or physicians. The mind sits enthroned in its immaterial majesty, employing the brain, and its continuous elongation in the nerves, not only in directing all the intellectual, moral, and instinctive faculties, but in the perception by the several senses, and in the mobility of the voluntary muscles, in obedience to the will; and in a subordinate way, by innervation, it may be regarded as enabling every organ and tissue in the human body to perform its destined function, in conformity to the vital laws.

"Insanity," says Dr. Brigham, "cannot be a disease of the immaterial mind itself, but of the brain." "The immortal and immaterial mind is in itself surely incapable of disease, decay, or derangement," for, "if the mind could be deranged, independent of bodily disease, such a possibility would destroy the hope of immortality, which we gain from reason (and revelation), for that which is capable of disease and decay, may die." Hence, "in all attempts to benefit and cure this unfortunate class of beings, they have been assigned to the physician, and treated for a corporeal disease." "The phrase, derangement of mind, conveys an erroneous idea, for such derangement is only a symptom of disease of the head, and is not the primary affection. When moral or mental causes produce insanity, they first occasion functional or organic disease of the brain."

Dr. Haslam says, "Insanity is always connected with organic alterations of the brain."

"Dr. Spurzheim always found changes of structure in the heads of insane people," thus confirming the experience of Georget, Greding, Davidson, Esquirol, Combe, and other scientific observers, who might be cited, if called for, almost without number. Hence, says Dr. Parry, "that the brain is the material organ of all the mental faculties, scarcely, at this period of science, requires to be proved."

These authorities will suffice, though they might be multiplied indefinitely.

If, then, this organ of the mind—the *brain*—in both its hemispheres, becomes from any cause diseased in its structure, or impaired in its functions, the *moral* and *intellectual* phenomena of mind must of necessity be hindered, or perverted to a proportionate degree, and insanity, to greater or less extent, will be present. Nor is it at all rational to infer that the mind is itself diseased, because of either moral or intellectual perversions, if the instrument or organ through

which it acts, be the seat of morbid action. As well might we expect to have a harmonious concord of sweet melodious music, from a broken or shattered piano, because a skilful musician was presiding at its keys; as to look for sound intellectual or moral action from the mind, when the instrument or organ upon and through which it acts, is suffering from some serious malady. The mind sees through the eye, but this organ must retain its transparent cornea, and sensitive retina, else vision is precluded; the mind, losing its power of vision, when the organs of vision are impaired, though itself still retains it, and when the eyes are restored to their function, the mind again perceives as before.

Precisely thus when disease of the brain results in insanity; the mind is no longer able to act in a normal way upon its shattered organ, though itself has undergone no change. But when, as is often the case, the diseased brain is restored to health by nature or art, all the mental and moral, and instinctive powers are again developed as before, the mind at once resuming the use of its organ, the capacity of which has been recovered.

But all history, all experience, and all observation, have established the fact that partial mania, or monomania in any of its varieties, is only the indication and the precursor of general insanity; and this, whether the morbid manifestations are intellectual or moral, and hence the attempted discrimination of "moral insanity" as a distinct species of mania is purely hypothetical; for as the mind is the source of both intellectual and moral developments, any serious disease in its organ, or instrument the brain, must by a physical necessity, pervert both the intellectual and moral functions, whether the one or the other be the more prominently manifested. In either case the subject is insane, irresponsible and unpunishable, because of *insanity*, since the *moral depravity* in such case is the *fruit and the proof of diseased brain.* Insanity is none the less insanity therefore, because its manifestations are chiefly or wholly exhibited by a perversion of the moral faculties only, if the other pathognomonic signs of diseased brain are present. If these latter are absent, then we may safely infer, that either the insanity is *feigned*, or the moral perversions are the result of depravity and there is *no insanity* in the case.

The term *moral insanity*, does not mean as its use suggests, that *moral* causes have produced it, and *moral* remedies are to cure it. Neither is it meant that it is a *moral* disease in contradistinction to a *physical* one, as might very naturally be supposed from this title.

So far from it, the advocates for this name and the disease they thus designate, stoutly maintain that *moral* insanity arises from *physical disease* in those organs of the brain in which resides the function of the moral emotions; while those organs of the brain which regulate the intellectual faculties, in contradistinction from the instinctive and moral powers remain intact, or may retain their integrity and health. The mental health is sound, but the moral health is suspended or destroyed; which implies a duality in the mind, in a sense which psychology never dreamed of.

"No such disorder as moral insanity has been recognized by the English courts of judicature," says Dr. Prichard, nor is it generally recognized or admitted by medical or legal writers who are regarded as authorities. They know nothing of moral insanity, either as requiring control in the exercise of their civil rights, or as destroying or lessening culpability in criminal cases. Delusion still constitutes in the British courts the essential character of insanity, and is thus defined: "When persons believe things to exist which exist only, or at least in that degree exist only, in their own imagination, and of the non-existence of which neither argument nor proof can convince them, they are of unsound mind." "It is only the belief of facts which no rational person would have believed, that is insane delusion."

In American courts, the decisions of Lord Coke and Hale, and that of the fifteen judges, at the instance of the House of Lords, in 1843, are still relied upon as authority, and what is called the "right and wrong" theory, has been almost universally recognized in criminal courts, when the plea of insanity has been tried. Nor have any of the numerous attempts to obtain acquittal of prisoners on the distinct ground of *moral* insanity, been successful in the United States. It "is equally true, however, that while rejecting the doctrine of moral insanity, irresponsibility has been admitted on the ground of insanity, by our American juries under the direction of the courts, when it has been proved that the alleged crime was the 'immediate unqualified offspring of the disease,' in the language of the law, under Lord Erskine and Lord Kenyon. This is probably the least exceptionable test ever applied by the courts.

It is but just to add that Judge Edmonds, of New York, is cited as having been the first on the American bench to recognize the existence of "*moral* insanity," which he did in the case of Klein, a homicide, in which case, however, the proofs of physical and intellectual insanity were so obvious that an acquittal was rendered on

unequivocal grounds, as was confirmed by his history in the lunatic asylum, where he died demented.

II. But we now proceed to inquire "wherein does such moral *insanity* differ from moral *depravity*," as defined by our standards? "I find a law in my members, warring against the law in my mind." "When I would do good, evil is present with me." "He that knoweth to do good, and doeth it not, to him it is sin." "He that knoweth his Master's will, and doeth it not, he shall be beaten with many stripes." "As a man thinketh, so is he." "*Vide meliora proboque, deteriora sequor.*" "I see the good, and yet the ill pursue." Here we see, by Christian and heathen authorities, that such "moral insanity" is a synonyme of "moral depravity," and that responsibility and "punishability" are not to be shunned or evaded by this plea. Intellectual insanity, resulting from physical disease in the brain, either functional or organic, and to an extent which incapacitates from reasoning correctly, by reason of illusion, delusion, delirium, or hallucination, can alone release from the obligations of morals and law, in the judgment of sound juridical authorities.

The writers who have successively urged this plea of "moral insanity," in behalf of criminals of every grade, maintain the doctrine that the instances of moral depravity, and especially the examples of the most hideous crimes, are all so many evidences that "moral insanity" exists, and that the parties are thus depraved, because of this malady. The greater the criminal, say they, the more reason exists for interposing this plea, for no man in his senses would or could perpetrate such "deeds of blood, as make the cheek of darkness pale." Hence, the practical effects of their creed are avowed to be sought in the abolition of the gallows, and the conversion of our prisons and penitentiaries into hospitals, where the perpetrators of capital crimes should be treated as patients, and not as criminals. Such men, they argue, are only the victims of a "faulty organization," their "moral organs" being too active, by reason of morbific causes, which impel them to their guilty career, with an "irresistibility," of which they are the hapless victims.

They differ with the great German expert, Heinroth, who stoutly maintained that *all insanity* originates in *vice*; for they assume the opposite doctrine, that all vice has its origin in insanity. Hence, they avow the opinion that the commission of crime is *prima facie* evidence of "moral insanity." Irresponsibility is therefore claimed

for all law-breakers, and the more desperate the criminal, the stronger is the evidence that he is morally insane.

There is a specific sense in which all the guilty and depraved may be said to be morally insane, as is distinctly taught in the Scriptures, and insisted on by a large class of theologians. The mooted questions of natural ability, and moral inability, co-existing in the same mind, are urged as exhibiting a clear intellectual perception of the path of duty, in those who are so imbecile in their will that their corrupt passions, strengthened by evil habits and vicious associations, overrule their intellect, and precipitate them into vice and crime. Such depravity may become irresistible, and yet irresponsibility cannot be predicated in such cases; but the contrary, since their moral inability is self-originated. Insanity may be, in a multitude of cases, the result of such depravity, by the vicious indulgence, when often repeated and long-continued, involving the structure of the brain in serious or hopeless physical disease.

That distinguished philosopher and philanthropist, Dr. Benjamin Rush, before the commencement of the present century, seems to have been the first to recognize that form of insanity, since called *dipsomania*, and, indeed, he preceded Pinel himself, in pleading for habitual drunkards, by ascribing their follies and crimes to *moral insanity*, which he defined "derangement of the moral faculty, or morbid operations of the will." Hence, to rescue such from the penalties of criminal law, he urged the opening of hospitals, or sober houses, for their physical restraint and moral treatment, alleging that they were as fit subjects for such sympathy, as other mad people. He declared all such to be monomaniacs, the victims of physical disease, which he, with philosophical accuracy, located in the brain. He taught that, although their drinking habits were the fruit of moral depravity at first, yet, after the brain itself had become diseased by this vice of indulgence, their continued drinking was the result of insanity.

The professions of both medicine and law have conceded to the justice of his views, and hence a wise distinction has been made in the statutes between the delirium of recent intoxication, which is regarded by the courts as no excuse but rather an aggravation of crime; and the insanity which accompanies a paroxysm of *delirium tremens*, which is held to be a legitimate defence against the penalties of the law. This may be called a moral insanity, but it is primarily a physical, and secondarily, an intellectual insanity, and is included in our proposed definition, by the presence of disease in

the brain, and the unconsciousness of the change which has occurred in the mental functions, even while they are terrific and appalling to every beholder. Our profession are at no loss in identifying this form of *mania-à-potu*, nor are the courts and juries embarrassed by any conflicting decisions or precedents.

III. We next inquire: "If insanity, whether intellectual or moral, be the result of physical disease in the brain, either organic or functional, are not the distinctions between mental and moral, with that of partial or monomaniacal insanity, wholly fabulous and visionary?"

This name "insanity," though now conventionally employed to designate the various degrees of *mental* alienation or aberration exclusively, was originally applied to indicate the mere negation of health, and included all corporeal disease. In the present use of the word, limited as it is to diseases of the brain, and hence restricted to a morbid perversion of the intellectual and moral powers, it still includes any and every departure from health in the mental manifestations; and this may be either temporary or permanent, partial or entire, intellectual or moral, hereditary or acquired, curable or incurable. It includes generically, therefore, all the species of idiocy, melancholia, dementia, mania, and monomania, both intellectual and moral, paralysis of the brain, together with the innumerable sub-species into which writers have divided and subdivided each of these varieties, as for example: *Morbipathetici*, *Dæmonomania*, *Erotomania*, *Nostomania*, *Suicidal mania*, *Homicidal mania*, *Puerperal mania*, *Pyromania*, *Cleptomania*, *Dipsomania*, *and recently the crimes of forgery, or a propensity to make negotiable paper with other men's names affixed*, has been ascribed to "moral insanity," and hence named *Papyromania*.

Under the general title of insanity nearly all these real or imaginary distinctions have been recognized by physicians, and most of them diagnosticated and recorded by professed experts. Hence, the terms sane and insane are understood to describe the two opposite states of a *sound* and *unsound mind*, which, by common consent and on good and sufficient grounds, imply the absence or the presence of a diseased brain.

It is only in questions of medical jurisprudence, arising in *civil* or *criminal* courts of judicature, that any nice distinctions are required as to the species or degree of insanity existing in individual cases. But in the former, the highest interests of families and

individuals are often at stake, as when a testamentary capacity is denied or doubted; or when the attempt is made to alienate the control of property from a party, on the ground of alleged insanity or lunacy. While in the latter, both liberty and life may be in jeopardy, and the tremendous decision of innocence or infamy is often suspended upon the admission or the rejection of the plea of insanity, when urged in behalf of alleged criminals. It is in these and the like cases, that our profession are so often appealed to for testimony and for opinions as to the kind and degree of insanity, for the purpose of aiding or guiding courts in their decisions as to the extent of the incompetency, incapacity, or irresponsibility claimed to exist in the party, alleged in the ambiguous language of the law to be *non compos mentis*, lunatic, or insane.

There is assuredly no more important or responsible position in which any medical man can be placed, than when called to be examined before a legal tribunal in a case of this character. Nor is there any duty so difficult to perform, without special preparation, by a cautious and diligent investigation of the individual case, and a full knowledge of its history, its etiology, its symptomatology, and, in short, its pathological phenomena, with the periods and order of their development, together with all the morbid perversions, intellectual, moral, or instinctive, which he can observe, or otherwise authenticate. Nor should an opinion ever be given by a medical man, in any doubtful case, on a cursory or brief examination, nor without such special preparation and repeated interviews as to protect him from his double liability to imposition and error. The insanity may be, and often is feigned so skilfully as to deceive the very elect; while, where it exists, it is sometimes so adroitly concealed by ingenuity and artifices which insanity itself can alone invent, and which none but professional experts can readily detect, and these only after oft-repeated and continuous vigilance and skill. Hence, we cannot be too strongly impressed with the complicated difficulties and fearful responsibilities involved in such professional positions.

More especially is this view of the subject to be taken when that form denominated moral insanity is alleged, either in civil or criminal cases, as involving incapacity or irresponsibility. In the one a sane man may by our error be deprived of his dearest rights, the control of his possessions, which may be the fruit of his life-long labors, industry, and economy; involving, it may be, perpetual imprisonment, with the risk of becoming insane by the severity of

the infliction. While, in the other, we are liable either to be instrumental in cursing society by shielding criminals from the just retribution of the law for their moral depravity, or the still worse alternative of contributing to consign to the felon's cell, or to an ignominious death, one whose insanity should receive naught else but the sympathy and commiseration of earth and heaven.

Happily for us, however, insanity is so well characterized when fully developed, that with ordinary caution and vigilance any well informed physician may recognize it, without any possible error, so that in a large majority of cases the legal certificate, that the party is so "disordered in his senses by lunacy or otherwise, as to render it unsafe to himself or others to be at large," can be given without risk either of doing injustice, or the hazard of reputation. It is only in less than a moiety of cases in which insanity is alleged, that the fact of its existence is at all doubtful, when inquired into by a competent physician; and the most frequent of these dubious examples are those in which "*moral* insanity" is urged as a plea in defence of criminals, or claimed to exist in civil cases, as in disputed testamentary capacity, or when attempts are made to dispossess such persons of their estate, by transferring it for safe-keeping to legal guardians. For if the insanity in these latter cases were well characterized by intellectual perversions, there would be no occasion for resorting to this recently coined distinction of *moral* insanity; and hence the attempt to allege it in any case, ought to be regarded with suspicion and distrust.

It is an extraordinary and suggestive fact, that nearly all who have adopted the theory of moral insanity as a distinct entity, and attempted its recognition in our jurisprudence, should unite in denying the existence of monomania, or partial mania, while they insist that *sane* or *insane* are the only distinctions to be admitted, in deciding the questions of capacity and responsibility under the civil and criminal law. And yet, with strange inconsistency, while making this exaction, they utterly refuse to agree in any definition of insanity, and allege that it is impossible to define it, because of its numerous varieties and phases, which defy all generalization. But, singularly enough, they are ready to define *moral* insanity, as we have seen; plainly a *partial* mania, by their own showing, involving only a part of the constitution of mind; and yet they insist that this perversion of the moral powers, while the intellect is unimpaired, shall be regarded as unquestionable insanity, entitling the party to exemption from the obligations of law, and impunity

for any crime. In regard to all the other forms of insanity, they withhold any definition, and leave the courts and juries, the counsel, and medical witnesses, each to define and discriminate at their own several option, and this even in works professedly written on the medical jurisprudence of the subject. And though it may be the fashion of the times to decry the decisions of the bench and bar, and denounce the verdicts of jurors, and the judgment of the courts in our own country and in England; yet, physicians should be better enlightened among themselves, and be able to present an intelligible and unexceptionable definition of what insanity is, before they so flippantly become the censors of the jurisprudence of insanity, of which they themselves know so little.

The bench and the bar have everywhere deferred to medical testimony, in all questions of forensic medicine; and especially in the jurisprudence of insanity. No man in any civilized country can be confined in an asylum, abridged of his liberty, deprived of the control of his property, or released from his responsibilities to civil and criminal law, without the judgment or testimony of medical men, as to the fact of his being *non compos mentis*, or of "unsound mind," in the language of the law. The courts and juries everywhere rely upon physicians for their guidance in all such questions. And we owe it to this deference everywhere extended to our profession in these important cases, to see to it, that the administration of justice is not embarrassed by the incompetency of our representatives, for lack of adequate instruction being included in the training provided in our medical colleges and schools.

But how have we responded to the just demand of the legal profession in this regard? Dr. Pliny Earle justly complains that this "subject of insanity does not enter into the programme of lectures in any of our leading medical schools. It is safe, perhaps, to assert that not one in ten of the graduates of those schools has ever read a treatise upon mental disorders." Indeed, the department of medical jurisprudence itself is either wholly ignored in the curriculum of our universities and colleges, or merely appended to some other chair or chairs, by way of formal recognition, and this for the most part *stat nominis umbra*.

In Germany, this subject attracts greater attention than in any other country. As early as 1811, the University of Leipsic founded the first professorship of Psychiatrie, which was long filled by the late Dr. Heinroth. Soon after, the establishment of clinical teaching

in the asylums was sanctioned by government, and at the instance of the several faculties, attempts have been made to include such clinics among the requisites for graduation, on the rational ground that if physicians are to be intrusted with the treatment of insanity, they should be obliged to study the disease under capable and experienced teachers. It need scarcely be added that, with such opportunities in the German asylums, a multitude of students are found improving them, so that in most of the institutions for the insane in that country, those physicians who have been thus clinically trained are employed as superintendents. It is full time that this subject should receive greater attention in the United States, as it doubtless will do under the enlightened guidance of the American Association of Superintendents, and the American Journal of Insanity. The demands of our civil and criminal courts all over the land, for competent and intelligent medical testimony, must be met by raising up an army of experts in every department of medical jurisprudence, and especially on this important topic of mental aberration. Else the ignorance of too many physicians, displayed before the courts and juries, may lead to the undervaluation, if not the rejection of medical evidence in all such cases.

In the *Cyclopædia of Practical Medicine*, the justly distinguished American editor strongly corroborates these views.

"In regard to the nature of the testimony relied upon in cases of insanity, and the mode of judging of the same, there is much room for animadversion. Too great weight appears to be given to medical testimony in such cases. It has always been the expressed conviction of the writer, that medical men are no better judges of the existence of mental alienation than well informed and discriminating individuals not of the profession. The only advantage at least which they can be presumed to have is from the constant habits of observation and discrimination, which the practical exercise of their profession requires. Yet for no other reason than that they belong to the medical profession, inferior men whose judgments on any other subjects would be contemned, are often called upon to establish the existence or non-existence of a mental condition which demands the most rigid and careful scrutiny." A modern able writer in the *British and Foreign Medical Review*, thinks it "essential for justice to abolish medical testimony as it is at present given on trials for crime, where insanity is the plea, and that questions of this important nature should be referred to a

board of twelve or more competent men; the state of mind of a person accused of crime, should not be left to be decided by those members of the profession whom the prisoner or his friends may select, for their known support of his case. As to the questions of his responsibility and punishment, these should be intrusted to the authorities of the law. The whole subject is surrounded with difficulties, and hence much room is left for the ingenuity of counsel, to act upon a jury generally composed of men who are eminently unqualified for forming any correct judgment on the intricate subject submitted to their decision."

It is alleged, that our legislative and judicial maxims on this obscure subject of insanity are ancient, and indeed antiquated, in view of the increase of scientific light and knowledge which medical men have attained in this department since those venerable maxims were adopted in jurisprudence. But how is it that with all our boasted improvement, we still refuse to *define* or submit any *test*, in which we are willing that courts and juries may confide? We object most strangely to the rule laid down by the law, and yet we propose no new rule, and even deny that there is any rule which can apply in all cases. But every physician, because he is such, speaks *ex cathedra*, because he thinks himself an oracle, in announcing his medical opinion that a man is *sane* or *insane*, which many do with a confidence proportionate to their ignorance. And when called upon by the ministers of the law for the grounds or reasons upon which their opinion is based, they are "wiser than twenty men who can give a reason," while they reply, "no definition is possible, no test is reliable, but your 'right and wrong' theory is arrant 'nonsense.'" We doctors are the judges, and "wisdom will die with us." Verily, we assume that another Daniel has come to judgment.

That our brethren of the bench and bar should smile at our ludicrous assumption of infallibility, and that a common sense jury should ignore such incoherent testimony, and even impute "moral insanity" to such doctors, is not at all marvellous.

But the profession of law, in view of our reciprocal relations and mutual responsibilities, are entitled to an intelligible explanation, if not a specific definition, as well as some reliable test, on which they and we can rely, as characterizing those forms and degrees of insanity which are to be recognized as exempting from responsibility to the laws of the land, especially in criminal cases. It is

only in the absence of any medical definition or test, our profession having failed to furnish either, that the bench has been appealed to by the bar for such definition or test. Hence, the recorded decisions of the courts in every country have, with singular uniformity, concurred in the "knowledge of right and wrong," or the "knowledge that the act was contrary to the laws of God and nature," at the time of its commission, as the definition and test of *sanity* for the guidance of juries. But many in our profession have been ever remonstrating against these legal decisions as defective and erroneous, and alleging that such "knowledge" is often possessed by the insane, who are unquestionably such. Still, however, we declare ourselves wholly unprepared to lay down any other or better rule of judgment; nor is there any other definition or test, upon which the medical profession have ever agreed. Our highest authorities seem to content themselves with denying that any definition is practicable, or any test conclusive, although every medical sciolist and tyro expects his ipse dixit to be infallible, and the bench, the bar, and the jury are all profoundly to cower before a medical certificate of insanity, and the dictum of a professional man that the solemn judgment of the fifteen judges of Great Britain and the House of Lords, as to irresponsible insanity, is "absurd and nonsensical," must become the law of the land.

As a humble contribution towards a better state of understanding between our profession and that of the law, which may be regarded as hypothetical merely, we propose in this paper an attempt at a definition and test of insanity, which may be taken for what it may be worth.

Insanity, then, may be thus defined, viz:—

A *disease of the brain*, by reason of which the functions of the mind are disturbed, perverted, or alienated, without the consciousness of the intellectual and moral change which has occurred.

This definition includes any and every disease of the brain, acute or chronic, primary or secondary, functional or organic, in which disturbance, perversion, or alienation of the moral or intellectual faculties occur, without the consciousness of the change. In all such cases, the subject is of unsound mind, *non compos mentis*, insane.

The condition precedent, is any disease of the brain adequate to the suspension or overthrow of the functions of the mind? Of the signs of such disease there are at all times rational symptoms cogni-

zable in some portion of the nervous tissue, which, in whatever part of the body, is but an elongation or distribution of the brain.

Hence, the existence of corporeal disease, located in the brain and nervous system, is a *test*, and *the only true test* of insanity, the presence or absence of which is proved or disproved by the morbid or healthy condition of the brain. If the brain and nervous system are in health, the mind can and does perform its functions, and vice versa, if the brain and nervous system are diseased, the mind is hindered in its functions in a degree proportioned to the nature and extent of such disease. Sanity and insanity are thus *defined* by a practicable and reliable *test*.

Thus far, however, it must be obvious we have only defined insanity to be "the disturbance, perversion, or alienation of the moral and intellectual faculties of the mind, because of a disease of the brain, which renders the subject unconscious of the change."

The questions as to the nature or extent of the insanity in any given case, is one which forms a subsequent inquiry, wholly distinct from the former. It may amount only to singularity, eccentricity, or waywardness, and may or may not develop itself as a serious malady. It may, however, go beyond this, and yet be *only* melancholy, monomania, or partial insanity. And again it may exhibit itself in the *moral* faculties being perverted chiefly or exclusively, and in other cases only the *intellect* may be disturbed, while in still others *both* the moral and intellectual powers may be thus morbidly affected. In some instances the *physical* functions may give equal evidence of abnormal derangement with the *mental;* while, again, the general *corporeal* system may not exhibit any considerable departure from physical health, while the functions of the *mind*, moral and intellectual, may be overwhelmed with morbid action in the brain. So mysterious and obscure are the mutual relations and dependence of the corporeal and spiritual nature of man, that the effect of disease of the body upon the mind, and the influence produced upon the body reciprocally when the functions of the mind are deranged or impaired, is a problem which in the present state of our knowledge remains unsolved. But, happily, a solution of this problem is not essential to our inquiry; it is the *fact*, and not the *manner* of the fact, which concerns us here.

Still, however, we have not reached the important topic of legal and moral responsibility, except by indirection and implication. True, we have defined insanity, by showing in what it consists, and we have seen a few of the phases it assumes, and indicated a num-

ber of these varieties. But the question recurs, of what practical use are these didactic averments in the jurisprudence of insanity? Let us see.

In the State of New York, as elsewhere, the revised statutes provide that

"*No insane person can be tried, sentenced to any punishment, or punished for any crime or offence, while he continues in that state.*" And again,

"*No act, done by a person in a state of insanity, can be punished as an offence.*" This last clause has, however, been authoritatively interpreted, by inserting after the word "insanity," the words "*in respect to such act,*" thus providing that it must be an "*insane act,*" and not merely the "*act of an insane person,*" which is exempt from punishment.

The language of this statute is sufficiently explicit, and would seem to be liberal enough in its terms, to secure all the insane from "punishability," and protect our commonwealth from the imputation of "judicial murder," so flippantly alleged by pseudo-philanthropy, as represented both in the legal and medical profession, when capital punishment has been inflicted, not upon the insane—for that were impossible under our law, which exempts all such even from trial, for any offence. But these clamors are put forth, because the plea of insanity has not been sustained by proof. Either the evidence of insanity was not presented, or its character and amount were insufficient to convince the jury. Indeed, it is scarcely possible, under our law, that any insane person can be tried, much less convicted or punished, for any offence whatever, so express and specific is the statute. The danger of escape from punishment under the feigned pretext of insanity, or by corrupt evidence, as through bribery or perjury is infinitely greater. And it is so by design, for it were better that a hundred guilty men should escape, than that one insane criminal should be punished.

It is plain, then, that the law in our own, and other civilized countries, provides and intends that no *insane* person shall be punished for any crime. The rule of the judiciary, everywhere, is, that the fact of insanity must be proved by competent testimony, and the medical evidence is very generally conclusive, where the witnesses are intelligent and honest. It is true that antiquated opinions of jurists; and ancient decisions of courts, often embarrass such inquiries, by introducing the dogmas of "*delusion, illusion, hal-*

lucination, *irresistibility*, *impassivity*, *brutality*," &c., all of which, by the way, are terms for which our profession is responsible, by substituting theories for facts, and multiplying, instead of simplifying, definitions and tests, thus rendering "confusion worse confounded." Nor can we look for the correction of any errors on this or any other medical subject, in the administration of the law, by our tribunals of public justice, unless our profession shall furnish some standard authority for both definition and test, upon which we are willing to rest, and to which our judiciary, bar, and jury, may appeal in weighing our evidence, as it is their right and duty to do.

That such standard definition and test is practicable, we have only to prove, and both legislative and judicial action will soon substitute it for the rules of law, and the precedents found in the books. And we submit that proposed here, only in the absence of a better, and until such an one shall be offered by wiser heads.

Let us now for illustration, suppose that we testify, professionally, that a man is *insane*, and this plea is urged in bar of trial, because of our opinion and testimony under oath.

We are next interrogated as to the evidence on which our opinion is founded. Our reply is, we find the man presenting the symptoms of a diseased brain, which we describe to the court. These symptoms are *physical*, *intellectual*, and *moral*, and though the first might raise the presumption of insanity, yet, when accompanied by either or both of the latter, they become unmistakable and conclusive.

If inquired of as to our theory on the subject we reply, 1st, that the brain is the organ or instrument of the mind, of which fact we cite the proofs.

2d. That the intellectual and moral faculties belong to the constitution of the mind, and that they are exercised through or by the brain, and invariably correspond to the state of that organ, whether healthy or morbid, and are temporary and partial, or permanent and entire, as the nature and extent of the disease in the brain is greater or less, functional or organic.

Is it next inquired what kind of insanity exists in this case? we reply—

1st. An insanity which is the opposite of sanity, for the two states cannot co-exist.

2d. It may or may not be entire, for this depends on the extent of the disease to both hemispheres of the brain, which we may not

be able to affirm. It may or may not be partial—on one subject, or on many subjects. It may be exhibited in the physical, intellectual, or moral functions, either singly or in combination, and with more or less prominence in one or the other; but in either case the man is insane, and this, whether he have or have not lucid intervals, and whether longer or shorter.

But it may be asked by the court whether the man was insane when he committed the crime? Of this the jury must be the judge by other than the medical evidence, our opinion being founded on the existence of physical disease at the time of our inquiries being made. The known pathology of the brain may, however, be cited, that all maladies of this organ are slow in their inception, and still slower in convalescence. If, therefore, insanity is proved to have existed shortly prior to the act, and is found still to exist since, we may legitimately infer, and testify in the affirmative.

Still, however, a much more difficult question may be propounded, if *moral* insanity only is alleged; and it may be inquired whether a perversion of the moral emotions, feelings, and propensities, being proved to exist anterior and subsequent to the criminal act, while the intellectual powers were unaffected, be insanity at all, or such insanity as to give impunity to the offender? To this we might safely reply, that this depends upon the evidence that such perversion depended on disease in the brain, and that no consciousness was betrayed of any change in the moral sense or status, for this is our definition and test. Such insanity arises from physical disease in the brain, the organ by which both moral and intellectual functions are performed, and the perversion of either or both, *if from this cause, is insanity.*

But, in the absence of the pathognomonic signs of disease in the brain, if a criminal perversion of the *moral* powers be urged as a plea for irresponsibility to the obligations of law or its penalties, then it becomes the highest duty of our profession to rally to the rescue of morals and law, by protecting the administration of justice for the public security. For, in the language of Forbes Winslow, Esq., the able British commentator on this subject:—

"What are the peculiar or characteristic symptoms by which we are enabled to distinguish this form of insanity, in which the individual is not responsible for his conduct, from actions which are essentially vicious, and which justly render the persons amenable to punishment? Can we safely draw the line of demarcation be-

tween vice and moral disease? Where does one commence, and the other terminate? If it be said that the impulse to commit murder is the result of a disease of the moral propensities, you will afford a ready and convenient palliation and excuse for the most atrocious offences. Society will no longer be safe. The prospect of punishment will not deter men from crime. The person disposed to murder may reason himself into the act, under the belief that he will be pronounced a moral maniac, and thus escape the consequences. I am not surprised that doubt should exist in the public mind as to the existence of the form of insanity termed homicidal, when we consider the natural tendency of the arguments advanced by those who have attempted to sustain this novel doctrine. Because a person may be proved to be strange and wayward in his character, to fancy himself a beggar when he may have the wealth of a Crœsus, or to be ill when he is in health—to believe that such a person ought of necessity to be exonerated from all responsibility, is a doctrine as unphilosophical and untenable, as it is opposed to the safety and well-being of society."

In concluding this paper, and before presenting the practical inferences we have aimed to reach on the topic committed *to us* by the Association, we cannot refrain from alluding to the technical liability to prosecution to which physicians are often subjected, by the performance of the duty they owe to society and to the insane themselves, by certifying professionally to the insanity of parties, and thus procuring their arrest and confinement in an asylum or hospital. Even when there is just ground and imperative necessity to prevent homicide and suicide, after both have been attempted by insane persons, the medical man, whose affidavit is indispensable to their confinement, for their own safety and that of others, is liable, under the existing laws, to be sued for assault and battery or false imprisonment, and subjected to exorbitant bail bonds, and often years of expensive litigation, when the party is recovered, or, as he often is, discharged by habeas corpus during a lucid interval. Some of our profession have suffered such annoyance for public duty, even when performed gratuitously, that they decline officiating in such capacity without an indemnity bond for self-protection; and thus homicide, suicide, and other crimes of the insane are often the result of the reluctance of physicians to interfere, when the law affords them no protection in the discharge of this duty. A paroxysm of insanity is often known to the physician before the

family or friends believe or suspect it, and his warnings of the danger of suicide are often disregarded until too late; and so when the impulse to homicide and other crimes is apparent, the wish to conceal the fact of insanity prompts the refusal to the restraint which is demanded for the safety of all concerned, unless the physician volunteers to take the responsibility of preventing crime by causing the arrest and transfer to the asylum of such insane patients. In these and similar cases, ought not the laws to protect the doctor from the pains and penalties of a civil prosecution, for discharging his duty to the community?

May we not confide in the legal profession for an effort to secure legislative enactments against such prosecutions, as obviously unjust as impolitic? Or as, in a similar liability to vexatious suits for malpractice, must we protect ourselves by requiring ample security from the wealthy friends of the insane, before certifying to the facts, and this when these patients cannot be lawfully admitted into any asylum, or even be restrained of their liberty at home, without such certificate? And what is to be done with the insane paupers, whose families cannot give us indemnity? Are they, when thirsting for blood, and even making insane attempts at self-destruction, to be suffered to go at large, and let loose upon society, by our concerted refusal to incur the risks of such hazardous service?

Unless we can, with safety to ourselves, interpose professionally in such cases, when humanity and the public security call for our action, it is our interest, and will become our duty, to decline interference. Very many heinous crimes are perpetrated and multiplied all over our country, and hundreds of suicides are reported, both the one and the other being the fruit of insanity. If these wretched victims of disease were humanely sheltered from harm, on the first indications of the impulse to their bloody crimes, which physicians can generally discover before they have ripened into these deeds of blood, the moral sense of the community would not be shocked as now, by the appalling repetition of self-murder. The reports daily and nightly recurring, of persons found drowned, or poisoned, or butchered, might, to a very great extent, be prevented. But medical men, through whom alone this waste of human life can be prevented, by the early commitment of such parties to an asylum, are entitled to protection by the law and its ministers, from such ungrateful return for their thankless services.

The practical conclusions to which we arrive are these, viz:—

1st. Insanity is a *mental* phenomenon, symptomatic of a *physical* disease, having its seat in the *brain*, and hence, can neither be *intellectual* nor *moral*, exclusively, but necessarily involves both *thought* and *feeling*, for the reason that the *mind* is the *source*, and the *brain* is the organ of both.

2d. No alleged insanity, which is not preceded or accompanied by *positive disease in the brain*, of which the physical signs are cognizable and demonstrable, should be regarded by our courts of civil or criminal jurisdiction, as justifying the judgment, either of *incapacity* or *irresponsibility*.

3d. When any disease of the brain is proved to exist, and a perversion or alienation of the moral or intellectual functions of the mind is present, while the subject is unconscious of any change in his mental or moral status; in all such cases, insanity exists to an extent demanding impunity from the penalty of any law; and the protection of society, as well as the safety of the insane subject, requires that he be committed to the custody and remedial influences of an asylum, or hospital, until his restoration to health and a sound mind is satisfactorily established by competent and adequate proof.

4th. All alleged "moral insanity," if unaccompanied by the preceding and simultaneous proofs of disease of the brain, by characteristic symptoms, should be regarded as *moral depravity*, for which, as well as for its consequences, the party should be held accountable to the law.

5th. No metaphysical or psychological theory of "irresistibility," or the loss of "moral freedom," should receive the countenance of our profession, in the absence of unequivocal evidence of physical disease, involving the brain.

6th. Neither "delusion," "illusion," "hallucination," "systematic design," "knowledge of good from evil, or right from wrong, or that the act was lawful, or unlawful, or contrary to the laws of God and nature," or "impassivity," or "hereditary taint," can be safely relied on, in deciding upon responsibility, or irresponsibility; the presence or absence of disease in the *brain*, being the only true criterion of sanity or insanity.

7th. In all cases of acquittal from crime, on proof of insanity, perpetual restraint upon liberty during life, by committal to an asylum; or until full proof of entire recovery; should be secured by *statute law*. The confinement of insane convicts should be in a

separate and distinct institution, nor should they ever be admitted to the asylums or hospitals for other insane patients.

8th. Medical psychology, especially in its relations to juridical inquiries on the subject of insanity, should be made an integral part of medical education; and clinical teaching should be introduced into every asylum for the insane, as a measure of public policy, the duty to devolve upon the superintendent of each.

9th. Until a general provision is secured for the education of all students in medical psychology, no physician who has not special qualifications, both by study and practice in this department, should consent to give testimony in cases of alleged insanity, unless after consultation and concurrence with an acknowledged expert. The reputation of the profession will else be jeoparded, if not compromised and destroyed, by indiscreet opinions, which the courts are obliged to overrule, or which are often notoriously disproved.

Meanwhile, let all the arbitrary distinctions into kinds and degrees of insanity, whether phrenological, metaphysical, or psychological, be ignored, when medical men are testifying in civil or criminal courts, and let their evidence be restricted to the relevant and single inquiry, whether the party is sane or insane. As to *insanity* on one subject only, with *sanity* on every other, it is a *myth*, as all practical men now admit, and hence the term monomania must soon become obsolete. So, also, *moral* insanity, co-existing with intellectual *sanity*, is a fable, unless *moral depravity* and intellectual purity can govern in the same mind at the same time, which is a mental and moral absurdity.

As a man *thinketh*, so is he. The appointed office of the *intellect* in man, is to govern and control the moral feelings and conduct. If the intellect is sound, to prate of moral or legal irresponsibility is a farce; while, practically, it is to "throw the loosened rein upon the neck of headlong appetite;" to abolish all distinction between vice and virtue, and overthrow all the standards of both morals and law.

Let physicians, then, keep within their province, the presence or absence of physical disease, and they will then be invulnerable to the cross-questioning of legal counsel. Leave the phrenology, psychology, and metaphysics of insanity to the gentlemen of the long robe, but claim familiarity with the signs of diseased brain—a physical entity; and having hence pronounced our professional judgment on the sanity or insanity of the party, let us leave the

law and its ministers to deal with abstractions, such as responsibility and punishability, which are questions foreign from our vocation, after we have acquitted ourselves of our own responsibilities in the premises. Our law will punish nobody who is proved to be *insane*. It is our province and duty to testify, authoritatively, and when we shall have agreed what insanity is, our evidence will never be set aside, either by an intelligent jury, or an honest judge, when we deal with facts, and not with metaphysical distinctions.

REPORT

ON

STOMATITIS MATERNA.

BY

D. L. M'GUGIN, A. M., M. D.,

KEOKUK, IOWA.

REPORT ON STOMATITIS MATERNA.

HAVING been appointed to report upon this anomalous affection, I find myself surrounded with difficulties in assigning to it an appropriate place in the nomenclature of diseases. Each observer of its phenomena has expressed himself in such terms as seemed to him best calculated to convey the idea he may have formed of its pathology, and hence the variety of terms used grew out of the different opinions entertained of the cause, or causes, in its production, and of the structures involved.

It is indeed strange that a certain set of phenomena, so uniform in their aspects, should have found, when so little has been recorded of them, so many different terms of expression. The fact that they present such slight shades of difference, would, in my opinion, suggest the use of a general term sufficiently explicit, and which would enable all to understand what is meant to be conveyed.

But unfortunately, no one term yet adopted would convey an idea of the cause and consequences without lengthening it beyond reasonable or convenient brevity.

The term *Thrush*, as used by Hippocrates when speaking of a disease of a grave character, which he declared was bad "in woman with child," would convey but an imperfect idea of the disease.

Stomatitis possesses also a signification which in part would be applicable, but still not sufficiently expressive. The common appellation of *nursing sore-mouth*, is synonymous with "stomatitis materna," and either is not wholly applicable. It simply declares that certain phenomena present themselves under certain conditions only, which is not true, for they present themselves in other states, and under other circumstances. "Puerperal anæmia" is not explicit, because it does not always manifest itself in the puerperal state. "Stomatitis in pregnancy and during lactation" is in its phraseology more nearly correct, for although it exists when

neither condition obtains, it is nevertheless always a continuation of an invasion, first made during the one condition or the other.

Thus it will be seen that no one of the terms in use is strictly applicable; they are all, nevertheless, more or less expressive, and would be understood if any one of them were sanctioned by custom.

Nosologists, in the future, should select that which is most in use, and for that reason I have chosen that by which, by common consent, the phenomena are designated, and which this Association has itself recognized. It is more or less significant, and has another desirable quality, which is its brevity. As it occurs in certain physiological conditions by some aberration or imperfection of the physical or vital laws, it is the more difficult to assign it a place in nosological arrangement, for the lesions manifest would not, at first sight, find a close or intimate connection with the exciting cause. Dr. Wood places it with "stomatitis," and Dr. Dunglison, in the *Encyclopædia of Practical Medicine*, speaks of it as a modification of aphthæ. Whether it should be classed with diseases to which it has a resemblance, or because of its etiological or pathological characteristics, I shall leave to others to decide after a more extended observation of its phenomena.

The opinion prevails among the non-medical, and to a certain extent among men of the profession, that this disease is *one of* recent origin, and that it grows out of the hygienic errors of the present day. This fallacy among the members of the profession obtains, because in certain localities it is unknown, though these were long and densely settled, and where the inhabitants have enjoyed all the luxuries and elegancies of life; medical men, of long experience and large practice, have never been required to treat a case of stomatitis materna. The late Dr. Dewees, of Philadelphia, never met with a case of stomatitis, and Dr. Wood, who is remarkable for the accuracy of his observations, has not observed it. The latter, in his valuable treatise upon *Theory and Practice*, quotes the opinions and observations of others, in the absence of personal experience. The northwest, where it has prevailed most, and where too it exhibits its greatest severity, has been settled but recently, and consequently the opportunities of continued observation have been but limited. For a long period, even here, where it prevailed from year to year, the number of cases during lactation only were enumerated, no notice having been taken of those which occurred during pregnancy, because it was supposed that it occurred only during lactation. This may afford an explanation for the increased number

of cases recently observed, and I am inclined to the opinion that this is more apparent than real. When the *pro rata* increase of the population to the increase in the number of cases is compared, we will find that there is no actual increase in the number of the latter over those which formerly occurred, had the cases been estimated which occurred during gestation. Even where it has prevailed continually from year to year, the number of cases would be, for the reasons hereafter given, very materially diminished, and therefore it would not receive the attention which its importance demanded.

As I have already remarked, stomatitis materna was supposed to be modern in its origin, and was one of the curses which has arisen as a punishment for ease, sinful indulgences, and great excesses. When we conduct our researches backward into the history of medicine in the past, even to the times and writings of Hippocrates, we find it to have been observed among the rude people of those ancient times. And to show that he was a close observer, it is very clear that he regarded it even during pregnancy as well as in lactation. Van Swieten describes a similar disease which prevailed in Holland as long ago as the beginning of the last century. Dr. Marshall Hall, of England, referred to it as having occurred very early in his professional career. Among the professional men of France it is regarded as a disease of no recent date, but one having existed in ancient times. In this country, according to Dr. Pray, Dr. Jackson met with it in Boston, Massachusetts, in which city he practised in the year 1800. Dr. Hale submitted a paper to the Society of that State on the same subject in 1830, which was followed by another by Dr. Bachus, in 1841, and published in the *American Journal of the Medical Sciences* of Philadelphia. Prior to this article of Dr. Bachus, Dr. Miner, then of Connecticut, stated to the Medical Society of that State, that he witnessed a visitation in an epidemic form of this malady, in the State of Massachusetts, in 1832, in the mountainous regions of that State.

There have been other contributors to the subject at different periods since then, among whom were Drs. Channing, Shanks, Taylor, Ware, Ely, Holt, King, Knapp, and Pray. The author of this report also called the attention of the medical public to it in an article published in 1851. Besides these, a number of others have given public expression to their opinions in answer to inquiries propounded to them by those engaged in researches concerning its symptoms, etiology, pathology, and the remedial measures

proper to be adopted in its treatment. From all these sources I shall endeavor to collate and embody such facts as will contribute to the elucidation of the subject.

The disease has appeared in different countries, as England, France, Germany, Holland, New Zealand, and in this country. Like almost every other affection, it is found more frequently in some localities than in others, and as it has already been said, certain other localities have been exempt. It has prevailed in the mountainous regions of Connecticut, Massachusetts, and some others of the New England States. It is supposed by some that season, thermometrical, and hygrometrical states, influence its production. Dr. Knapp says, that it is increased in its production and spread by a previous rigid winter.

Upon the eastern Atlantic slope, in the parallel of Philadelphia, which is 40°, it is seldom, if ever, found occurring there. But by pursuing the line west, after it crosses the mountains, occasional cases are seen, which increase in number as it is pursued west to this city, which is only 20′ north of the same parallel, and 14° and 20′ west longitude of Washington. In 1849, there was a population of 1,200, which increased up to this time to 18,000. During this period of a little more than eight years, I have seen in this city 54 cases of this disease, those coming temporarily into the city from other places are not enumerated. In Philadelphia, containing in the year 1850, a population of 408,762, not a case occurred, so far as known. How far north within the limits of settlement, and how far south it extends, I am not advised. It has been traced to Dubuque and Chicago, three or four degrees north, and to Kentucky and Tennessee south. According to present information, that district of country bounded by the Alleghany Mountains on the east, and the west lines of the States of Iowa and Missouri, and a part of Arkansas, may be considered as the region in which it prevails most.

In this region, where the occurrences of this disease are as frequent as in any other in which it is found, in the proportion of its population, the geology is peculiar with regard to the lithological character of the rocks.

There is first upon the surface heavy beds of sandstone, calcareous formations at the base, while intermediate is the coal bearing strata. The carboniferous system is that which prevails; the concretionary and magnesian rocks contain numerous fossil remains

of several varieties. The soil is alluvion, lying upon a deep bed of yellow clay.

The surface is undulating prairie covered with rank vegetation, but without swamps or marshy grounds. The timber is oak, walnut, elm, sugar-maple, and cottonwood, and disposed in groves and along the margin of streams. Springs are rare; but the water, when found by sinking shafts, is strongly impregnated with carbonate of lime; and that of the rivers, in addition to this, there are the chlorates with vegetable extracts in solution, and animal matters dissolved and undissolved.

The air is pure and bracing, coming in gentle and constant breezes during the summer from the southwest, and in winter the winds are from the northwest. During the summer there are frequent refreshing rains, attended with lightning and thunder.

The soil, after heavy rains, soon dries under the combined influences of the sun and air. So far as we are permitted to judge, the country is not remarkable for miasmatic elements; and thus far, in the history of the settlement of the State, it is manifestly becoming less so.

The hygrometric state of the atmosphere, it is maintained, favors the production and spread of the disease; but our observations would not confirm this view of Dr. Knapp.

In 1851, when this country was deluged with continued rains from early spring until the latter part of June, there were fewer cases than any other season since, in proportion to the population. On the contrary, it has been found to occur more frequently in hot and dry seasons. In the summer of 1856, remarkable for its drought and intensity of the heat, the number of cases was largely increased and aggravated in form. Nor, according to my observation, has the number of cases been greater when there were indubitable evidences of the general prevalence of miasm. It has occurred in midwinter, when the temperature had been for a continued length of time below zero, succeeding to an autumn of comparative exemption from periodic fevers.

The only epidemic influence with which it seemed to be blended, was that of cholera; there being, during and after its prevalence, an increase in the number of cases.

Seasons in which there was an abundance of fruit afforded no mitigation, nor did its absence exert any influence in the production of the disease. One fact I have observed, and that was, that the use of subacid fruit invariably aggravated the symptoms; and,

in some cases under my observation, the free use of them seemed to develop a previous lurking tendency to it. Any and all the causes usually assigned as potent agents in its production, such as intensity of cold, moist state of the atmosphere, deficiency of crops with consequent diminution of nutritive material, and malarious influences, can act as predisposing causes only so far as they may contribute to the diminution of the vital forces.

And yet it has not appeared as a consequence of famine in all cases of which I am informed; for in the trials to which the people of Ireland were made to submit a few years since, it is not apparent that the phenomena which characterized the disease following want in that instance, assumed the character of the one under notice. According to the reports of cases in which great emaciation occurred from a long continued deprivation of food, ulceration of the cornea has occurred; but no mention is made of other physical or pathological changes analogous to this affliction. It is true that structures less vitally endowed may be made to contribute to the maintenance of the more highly organized and endowed structures, as the loss of the adipose, fibrous, and other structures. There must exist, in addition to temperament of constitution or habit of body, some other more powerful predisposing cause, existing in the localities in which the disease prevails to favor its production, which, if known, would account for its general appearance and presence in those localities. The same latitude, similarity of climate, topography, and geology, with similar conditions of the people, will not show it in other districts. Whether the predisposing cause may be celestial, terrestrial, or the combination—the celesto-terrestrial—has not yet been determined at this stage of the inquiry.

I have already referred to one predisposing cause, namely: the constitutional habit or temperament. In all the cases which have occurred under my notice, they were those of strumous habit, and in whom the tubercular or scrofulous diathesis was present. When the disease makes its appearance during pregnancy, the child, after birth, often exhibits symptoms of the disease, and may perish in a short time if it be not soon arrested. In addition to the ulceration of the mouth, there are often in females ulceration of the labia and excoriation of the structures about the anus. These conditions sometimes obtain also in the adult. In one instance recently, in addition to the ulceration of the tongue and cavity of the mouth, the child was attacked with sphacelus of the fingers, which extended

to the hands, death following soon after manifestations. This child was one of twins, and I shall refer to it again, in order to show some other important features in this disease during gestation.

It is a disease which I am prepared to show is peculiar to females only, and is not identical, either in its etiology or pathology, with chronic stomatitis in the male, or the land scurvy as maintained by Dr. Knapp. In this opinion I have the concurrence of Dr. Pray in his able treatise on this subject to the New Hampshire Medical Society, and also of Dr. Knowles, whose opportunities of observation with both these diseases have been extensive, and whose opinions I will append to this report.[1]

When it occurs during lactation, and is continued until pregnancy again occurs, and during gestation, the result is often unfortunate, both to mother and offspring.

If abortion occurs in those cases, when it is protracted from lactation to pregnancy, in that event the disease is aggravated, from which, if the patient survives, the recovery is always slow. It is usual that the hemorrhage is great and difficult of control; hence, the great waste and expenditure of the vital powers, superadded to the previous enfeebling pathological conditions. My experience assures me that it not so frequently occurs in the rural districts among those who enjoy the benefits of the outer air, indulge in exercise, and subsist upon nutritious and assimilable food.

And yet, even under these favorable circumstances in the preservation of health and physical vigor, numerous cases are found, especially if the requisite hygienic rules and laws be not observed with respect to the proper ventilation of their apartments and cleanliness of their persons.

Symptoms.—Those who have carefully watched the progress of this disease from its incipiency, and have rendered themselves familiar with the symptoms indicating its approach, will have their suspicions awakened when they listen to the recital of the following complainings:—

A dull pain over the eyes; stiffness of the neck; ringing of the ears; dryness of the mouth, insipid, and sometimes a bitter taste; offensive breath; pain in the back, and others of an erratic character in the limbs; great languor, lassitude, despondency, and mental irritability. There is a loss of appetite; acidity of the stomach, with acid eructations; pain, with a sense of distension of the bowels.

[1] Dr. Knowles' report was not prepared in time to accompany this paper.

The face is pale, or wears an icterode shade; the conjunctiva also assumes a yellow tinge; there is also a purple circle under the eye; the lips are colorless, unless when there is irritative fever present, at which time they are of a dark red, and the cheeks wear a bright blush. The muscles are soft; the skin is in a negative condition; the capillary circulation imperfect; the extremities incline to cold; the step is made with a manifest effort, and a little exertion is followed by a hurried breathing.

I will here copy from an article written and published in 1851, in which I described the symptoms as accurately as was possible from observations of numerous cases previous to that time, and, as far as they go, they have been confirmed by extended observations since then. I will add such others as have been presented in the many cases which have occurred within the past seven years.

"The patient complains of burning heat, similar in sensation to that produced by hot fluids when taken into the mouth. *Food*, when taken, even of the blandest kind, is swallowed with pain and difficulty, and that which is solid is masticated imperfectly and painfully. The lower lip is tumefied, and turns out and downward; and in the efforts to speak, the saliva, limpid and scalding, pours over it. There is pallor of the face, an anxious and painful expression of the countenance, and a crescentic dark circle below the eye. The pulse is small and frequent, the skin dry, and the mind irritable and despondent. The mucous lining of the mouth is highly vascular and livid in color, the tongue red and often swollen, and early in the attack small granular elevations may be seen along its edges and tip, and still more highly vascular than even the surrounding mucous membrane. These points are highly sensitive, and much suffering is produced when the tongue touches the teeth or jaw. Very soon these show yellow vesicles on their tops, and in a short time these burst, leaving an ulcerated tip or depression, and rapidly, under the ulcerative process, extend themselves over the surface. They now multiply in number, and may be found within the lip, under the tongue, within the cheeks, and in the fauces. Now the suffering is great, for the surfaces of these ulcers are most sensitively endowed. They may extend down the œsophagus into the stomach, throughout the intestinal tube, into the posterior nares, down the trachea, along the bronchia, and finally involve the lungs in an irreparably diseased condition."

In some grave cases there is cough of a most harassing character, and so copious is the expectoration as to constitute bronchorrhœa.

The sputa may be thick, tenacious, or muco-purulent, and this last more or less sanguineous. There are wandering pains over the chest; respiration hurried and difficult; and in cases occurring in individuals, in which the tubercular diathesis was manifest, there were the ordinary physical signs of deposits in the apices of the lungs. In some cases the tubercular deposits had softened, ulcerated, and were discharged, as made manifest by the usual signs in such cases.

Hemorrhages from the lungs, the stomach, bowels, uterus, and the nose have been witnessed, and in one case nearly all these forms were presented alternately.

There is usually a burning pain in the stomach, accompanied with thirst. This is an early symptom, and is often accompanied with heat and dryness of the fauces. Food, when taken, of the mildest and blandest material, will produce much suffering, and even cold water, so much desired, will be followed, when taken, by a sense of pain and suffering.

There is often so much irritability that drinks, food, or medicine will not be retained, and its ejection is often attended with much effort and retching. Digestion being imperfectly performed, the food decomposes in the stomach, and gases are evolved. Hence, the almost universal complaint of distension, tightness, and constriction in the præcordial region. There is tenderness upon pressure, which often extends into the right hypochondriac region.

The bowels are usually constipated early in the disease; but this is often followed by an exhausting diarrhœa.

First, the dejections are combined with mucus, and there is more or less tenesmus. Soon the evacuations become more fluid, fetid, and with flocculi admixed. The patient complains of a scalding sensation during the discharge, and this burning sense is felt for some time afterward. Sometimes the color is a light green, but oftener of a dark brown; but there is always a large proportion of serum.

There is tenderness over the whole abdominal surface, with a collapsed condition of the parietal walls, and a painful constriction or contracted state of the muscles. In other instances, though rare, there is a tympanitic condition in the track of the colon, and afterward of the whole cavity of the abdomen, during which the distension is so great as to destroy the sensibility, and but little complaint upon pressure.

There is one feature which has arrested my attention as almost invariably presenting itself, and that is, that in proportion as the

mouth is relieved there is more complaint of the stomach, and when the mouth and stomach are relieved, the excitement upon the bowels is increased.

The urine is in the beginning normal in quantity, but somewhat heightened in color. Subsequently, when there is much exhaustion, it becomes pale. The deposit is usually urate of ammonia. It is found in protracted cases to contain mucous flocculi, and when this presents there is often a tendency to increased micturition and pain before, and at the time, the urine is discharged, indicating the fact that the disease, which has involved the mucous lining of the other cavities, has extended itself also to the mucous lining of the urinary cyst and along the urethra. The mucous membrane of the nose becomes highly vascular, and the interior lining of the cilia, and occasionally the conjunctiva, become reddened and inflamed, with diminished lachrymal secretion. Should the disease appear during lactation, the lacteal secretion is usually abundant, as is evidenced in the thrifty growth of the child. This fact shows that the disease does not arise from a morbid condition of all the constituents of the blood, in which event the milk secreted could not be normal. The abundance, too, indicates a liberal contribution in the part of the constituents of the blood, and hence the exhaustion complained of.

The catamenia very often appear regularly and very liberal even while nursing. I have been somewhat surprised at the frequency with which it presents itself. This was, doubtless, owing to the general laxity of the system and the less spissitude of the blood, because of the deficiency of the albuminous products of that fluid.

The predisposing causes have already been adverted to, and I now approach the exciting agent, or agents in awakening the disease into activity, and these may be enumerated to be *pregnancy* and *lactation*, in which the former is not so potent as the latter.

The next inquiry is, in what manner do these conditions so operate upon the physical system as to result in the production of pathological changes of the character and kind described? I here assume that the disease is *sui generis*. This is the opinion, likewise, of Dr. Judkins. That there is only one or other of the above exciting causes which can produce it. Temperament or peculiarity of constitution may predispose, but *ipso facto* cannot produce it. So marked is this fact, that I am surprised that any one can doubt it for a single moment. In other cases the medical mind has settled down and reconciled itself to the existence of a

specific cause, and yet we are still in doubt and darkness as to the *nature* of that cause. I here refer to intermittent fever as presenting certain peculiar phenomena, and the cause assigned is miasm. But in this instance we are able to determine the causes and show the intimate connection.

The identity between the phenomena and other diseases which it resembles has not yet been established, and until this is done this disease will be regarded as distinct in its pathology, as its causes are peculiarly distinct. An author of much celebrity says, "the kind of constitution most liable to this affection are feeble, delicate, breeding, and suckling women."

Dr. Judkins remarks, that "it has manifested itself as *sui generis*," and advises that if all other measures of relief fail, that the child be removed from the breast. Why? The answer is plain, that the *cause* is then removed. Dr. M. Hall maintains that "it is a shock, drain, or fatigue of the system, incident to parturition, abortion, or lactation." Drs. Hale and Bachus declare it to be a disease peculiar to suckling women, and may occur during pregnancy. Dr. Channing associates it with the puerperal state. So also of a majority of all the authors who have written upon the subject, from Hippocrates, whose opinions deserve a mention because of their antiquity, down to the present time. There is another fact in which all agree, that it arises from some error or perversion of digestion and nutritive assimilation; and if it be closely associated in its origin with pregnancy or lactation, these conditions must in some way pervert or interfere with the performance of these functions. It may be more proper to say that there has been a diversion of the products of the one, and the loss of the material designed to accomplish the other. The diversion, doubtless, leaves the system to suffer for want of its regular supplies, in the reparation of tissues and the performance of other vital functional acts. This diversion and use of the material to some other purpose would necessarily leave other structures to perish, because the means for their supply have been cut off. The cause of this diversion from the direction which the nutrient material takes to the several tissues by which it is selected, in kind and quantity adapted to the peculiar structure, and in accordance with the wants of each, is to be considered in our examination into the pathological conditions which are produced by this misdirection. The opinion entertained and advanced in 1851, is unchanged with regard to the pathology of this disease, and I still regard it as an error of nutrition. The demand for the

nitrogenized materials to promote the development and sustain the life of the ovum in utero, is such that the maternal blood becomes impoverished, so that the fibrous and soft structures are deprived of their accustomed nutrition in their maintenance.

Here, then, in my opinion, is the starting point of the disease, namely: in nutritive assimilation, not in digestion or a diminished supply of food. In these last cases the first lesion is in the stomach, where the secretions are left to prey upon the structures in a high state of vascularity, because the vessels have had no opportunities for relieving themselves. The change takes place, in stomatitis, in the blood; and the process of nutrition, which is the prominent feature in the sex, is interfered with, for other pressing demands must first be answered. The organized material being withdrawn or applied to another purpose, the tissues to which it rightfully belongs suffer from the want and become impoverished. Softening of these structures must follow, and to this again will be added ulceration as a consequence of innervation. The circulation, being feeble in structures, thus deprived of their nutrition, will become congested, and ulcerative inflammation follows.

These structures, it is well known, are peculiarly prone to ulcerative inflammation. The mucus, when secreted, is for the protection of these structures against invasion from mechanical or chemical agents, but the blood is too poor in these elements to furnish a requisite supply, even for reparation.

Such structures failing first, and suffering most, because of the withdrawal of the nutrient material from them, are exposed to other causes of inflammation. The food, if not in fact a cause in exciting inflammation, most certainly perpetuates it, for as digestion ultimately suffers, the food is liable to change, decompose, and become acescent, constituting an aggravation and perpetuation of the local lesion.

In strumous or cachectic habits and temperaments, the blood making power is diminished, and therefore unable to furnish a sufficient supply for its own and a new being. In such, the digestion is generally feeble and imperfect, which in the progress of gestation is often still further interfered with, and interrupted through reflex or sympathetic agencies.

The phenomena, therefore, may be almost as readily produced in pregnancy as during lactation, for the histogenetic material requisite for the growth of the fœtus is formed from the albuminoid materials in the blood of the mother. When *in utero* this nutrition

is furnished through the medium of the placenta; after birth it is supplied through the agency of the mamma, elaborated into another agreeable and nutrient form. In the first instance it was furnished constantly, in the other periodically. The effect to the mother is very nearly the same, as the material which she needed for herself has been monopolized by the offspring.

This view of the primary step in these pathological changes, from a physiological act performed in the process of nutrition, accounts for the languor and lassitude precedent to the lesions which subsequently manifest themselves. Similar, if not identical sensations, obtain after fasting for a length of time, for the demand for nutrition proceeds from and originates in the tissues, which have been expended without the means of supply. The nervous centres and the nervous system are wanting in the stimulus of normal blood, and hence the mental and moral manifestations. In scurvy, a disease with which stomatitis materna is claimed to be identical, the blood presents a change which has not been observed by me in the latter affection. Whilst connected with the army during the campaign with Mexico, I observed in the soldiers who had contracted scurvy when on a protracted cruise at sea, that in the hemorrhages from the gums, the nose and elsewhere, the blood was invariably intensely dark, amounting almost in some instances to the color of ink, and would not organize when exposed to the air. This indicated a blood disease, and although numerous cases of hemorrhage in stomatitis have fallen under my observation, the blood was found to be rather pale than dark, and the crassamentum, although not of normal proportions, is, nevertheless, healthy, readily separating from the serum. The proportion of the former, it is true, was not normal in amount, but yet there was vitality in that which existed, to take on an organization. The blood then was only changed in its proportions, and not in kind or quality, as is manifestly the case in scurvy.

The gums, which are spongy or porous in scurvy, are not so in the disease under consideration, for so far as my experience extends they are invariably hard, firm, swollen, and of a glossy red aspect. I have seen no case of hemorrhage from them unless from an extensive ulceration. The blood in scurvy, then, is diseased, while in stomatitis materna it is changed in proportion and abnormal to that extent, and because of the diminution of some of its essential constituents.

It is maintained by some of those who have contributed to the

literature of the disease, that it never occurs, save only in the latter stages of utero-gestation. I cannot subscribe to this view, having seen it in several instances, between the third and fourth month, and these too in subjects who had never suffered from the disease previously. Therefore, the position that the disease depends wholly for its production upon the presence of milk in the mamma, is not true in fact. A number of cases, and these too are frequent, when it makes its appearance as early as the fifth month before there is any considerable lacteal secretion. It does not occur except in connection with pregnancy or lactation save as a continuation of a previous invasion. When it occurs during lactation, then in the next pregnancy there is great danger that the patient will not survive the shock of parturition. Whether the mother survives or not, the infant often perishes. The treatment consists in increasing or supplying the nutrient principles of the blood, in preventing all unnecessary waste of the strength and vigor, and in relieving the lesions of the mouth and fauces. This last is important, in order that food can be duly masticated and fitted for stomach digestion.

The remedial measures will be found to be those which are denominated "blood makers."

The preparations of iron, however, although demanded, are often inadmissible, because of the irritation they produce in the stomach.

From the class of metalliferous tonics, the selection should be made from those possessing alterative powers. Nitrate of silver and the iodide of iron will be found useful, if admissible by the stomach. The hydriodate and chlorate of potassa, either alone, or combined with vegetable tonic extracts or infusions, will be found highly beneficial. That upon which I rely most, after a long experience in all the articles recommended, is the chlorate of potassa. It should be used internally in the form of solution, in the proportion of one drachm dissolved in a pint of distilled water, of which a tablespoonful should be taken three times a day. Pastes should be saturated with the solution, and allowed to soften in the mouth and mingle with the saliva.

I have recently prescribed the hypophosphite of soda in syrup, in a case which has existed constantly for nearly three years. The subnitrate of bismuth will be found in some cases to be valuable. It should be used in pill with the extract of humulus lupulus.

The fermented liquors will be found highly beneficial, such as porter, ale, and malt beer. I give the preference most decidedly to that class of beer prepared from the hops, with a large amount of

malt, and in an active state of effervescence. In this form we derive the benefits of the tonic properties of the hop, the nutrient principles of the malt, and the soothing qualities of the carbonic acid.

I have during the past year been highly gratified with the results of the use of this form of malt liquor, as well during pregnancy, as in lactation. The sensation, which is described as a burning pain in the stomach, was in every case much relieved by it, and several patients who had been thin and emaciated, acquired not only strength and vigor, but were relieved of their sufferings. One lady who had lost three children during their infancy, and who was spare, thin, and pale, found herself pregnant for the fourth time. She became dejected and dispirited lest her own life, as before, would be jeoparded, and that her offspring would follow those for whom she had grieved so much. She was advised to use the malt beer, and in a short time found herself with more strength and health than ever before under similar circumstances of domestic solicitude. She continued the free use of it during her term, and, when completed, she had acquired flesh, and strength to sustain her under the shock of parturition; as she continued its use afterward, she was enabled to nurse her offspring, which she had not been able to do with two of her former children, and continued to increase in weight up to this time. I could give a number of similar cases, with similar pleasing results.

Exercise in the open air is indispensable, while tepid bathing and a regard to purity and cleanliness are all important. The languor and listlessness, the repugnance to society or the union of friends, under other circumstances so much enjoyed, prevent her from seeking, or rather induce her to avoid the social circle, with its healthful influences.

Inducements should be presented to alter her determination to seclusion, and day after day she should be taken abroad. The importance of these hygienic measures should be well considered.

If, however, all measures fail to bring relief, and the patient is day after day wasting away under the exhausting influence of the disease, then, in order to save the life of the mother, the dernier alternative of weaning the child must be determined upon and fulfilled.

This, however, does not always arrest the progress of the disease when it has become chronic in its character, and has continued through several pregnancies.

I will here append several cases, embracing all the shades of difference in its appearance, as well as the treatment.

One of these cases (5th) occurred prior to 1851, and the others since then.

CASE 1.—Mrs. H——, aged 26 years, of strumous habit, was delivered of a female child, of less than average size, in the spring of 1855. During the period of utero-gestation, she suffered much from gastralgia and the usual irritation of the stomach. In consequence she was not able to take food regularly, and then in a limited quantity. Beside this, she remarked that some three or four months after the disappearance of her catamenia, her tongue and throat became sore, and with frequent discharge of saliva, which she attributed to the use of calomel, which she took two years before for some arthrodial difficulty. This symptom returned frequently during gestation, and disappeared when the suffering in the stomach increased.

After parturition neither symptom showed itself for some days, when the usual premonitions were followed by the sense of heat in the cavity of the mouth, with some rigidity of the muscles of the face.

Ulceration followed. The mammary secretion, which at first promised an abundance, began in a month to lessen. Meantime, the child was attacked with ulceration of the mouth, which rapidly extended itself through the intestinal tube, and a wasting diarrhœa followed, which no medication could restrain, and it died very soon afterward.

The mother continued to suffer more or less (even although the lacteal secretion had died away) from the gastralgic difficulty. Meanwhile, the tongue and the entire buccal cavity were found to be highly vascular, the latter, with the gums, wearing a shining red aspect, but without ulcerations. Diarrhœa generally preceded her catamenia a few days, which was abundant in quantity, and attended with pain. She became again pregnant, and soon the ulceration showed itself, and continued with increased suffering until her confinement.

There was again a cessation, and after lactation had commenced the stomatitis recommenced with renewed vigor, and continued with unabated severity, except when the diarrhœa was present. In a few days after birth this child also was attacked, and in the space of a few days it followed the other with the same disease, but in a

more exalted form than the other. It was less and more feeble than the first. With much difficulty she recovered her strength and health sufficient to leave her room, and afterward continued to suffer from it more or less. She was advised to seek the benefits of the mountain regions, which she did; but returned this spring still laboring under the disease.

The treatment from the first embraced all the known remedies in such cases, faithfully persevered in and changed to suit the conditions present.

About the first of April this year, having received, by the kindness of Mr. Hennell Stevens, a package containing an ounce each of hypophosphite of lime and of soda, I ordered a syrupy preparation of the latter, according to the formula of Prof. Procter, as given in his *Journal of Pharmacy*, for March of this year, since which time she has been taking it in doses of grs. iijss, three times per diem. Already there is a very decided improvement, for the mouth at this time is free from ulcers for the first time in a year; the cavity of the mouth is now more nearly a normal color than for three years; the appetite is good; and since she has been taking it, the diarrhœa, which previously occurred every week, has not troubled her. The pallor of the skin is less, and there is less mental depression. She describes the effect of the medicine to have been a grateful glow pervading the whole system, and assures us that she felt some improvement very soon after commencing with the drug. According to M. Churchill, if these preparations are valuable hæmatogens, and that they also favorably impress the nervous system, may they not prove valuable in the treatment of stomatitis materna?

CASE 2.—A young married lady, five months advanced in pregnancy, came to this city to reside in the spring of 1857. She was laboring under stomatitis materna when she arrived here; but how long before this, Dr. Little, who prescribed for her, did not know. She continued to suffer until her confinement, and a week after this event I was requested by Dr. Little to visit her, as he was required to be absent. Upon arriving at the house, the nurse called my attention to the infant in another apartment, which I decided was laboring under the symptoms of stomatitis, and upon entering the room of the mother I found her laboring under a most aggravated form of it, of a character for malignity which is not often seen, and with phenomena which I had not seen before. The mouth, lips, the inner lining of the nose, were thickly

studded with a peculiar incrustation of albuminous lymph, disposed in elongated prism-like vegetations. Every portion of the buccal cavity was bestudded with these, as also the fauces. The labia, too, were incrusted in the same manner with this unorganizable lymph. This exudation, in some particulars, resembled the aphthous deposit. The face was pale, the skin blanched, and the muscles flabby. The pulse was 130 in frequency, quick in its action, and very feeble. The respiration was only nine in the minute, and very slow in the respiratory movement. There were frequent fetid eructations, and the intestines distended with gases. The mind was apathetic, and the answers to questions were made slowly, as after long deliberation. That evening the child died, and the next day the mother breathed her last. The particular feature in this case was the bountiful outpouring of the albuminous material, as well as the form which it assumed, being diphtheritic in character.

Case 3.—Was a woman residing at some distance from the city, who, in the fifth month of her fourth pregnancy, suffered from an attack of ulcerative sore mouth after the usual premonitions.

The husband, in the relation of her case, remarked that she was much reduced, so much so as to force her to her bed. Her mouth was in such a condition that she was unable to take any other than the simplest articles of food, and her fauces were so much involved in disease that even after the mouth was reconciled to the presence of food, it was swallowed with difficulty and much pain. There had been either constipation or a diarrhœa, the appetite had failed, there was slight cough with expectoration of muco-purulent matter. I prescribed chlorate of potassa, and directed the use of malt liquors, preferring that containing the largest proportion of carbonic acid. This treatment was persisted in, and she improved rapidly up to her confinement, when she gave birth to twins. In a few days after the symptoms returned in full force, when the treatment was renewed with rigor. Meanwhile, one of the children was seized with the same kind of ulceration affecting the mother, and the fingers and hands became livid, sphacelus followed, and very soon after the child died. Before its death, the features were shrunken, and the integuments of the body were shrivelled and contracted. The other child was also attacked; but the solution of chlorate of potassa was used locally to the mouth, and used internally. This child recovered, and still lives, although to save the mother, it was removed from the breast, which measure, together with a persist-

ence in the treatment before adopted, was followed by her convalescence and final recovery.

The children, when born, were over the average in size. She had not suffered in this manner with either of her former children, and although manifestly of a scrofulous character, yet she was of good proportions, and of vigorous constitution prior to this attack.

Was the increased demand for developmental material, the occasion of its production in this case, superadded to others, ever present, and undefined agencies? The children were healthy, well developed, and plump, showing that they have been well and fully nourished.

But why do so many, born under such circumstances, fall so early the victims to this malady? Is the predisposition imparted through the maternal blood, and, if so, why do they exhibit such evidences of health at birth? Is there in the lacteal secretion a morbific element sufficiently potent to awaken, or excite the sleeping predisposition? Or is it excited because of the new relations to which it is called upon to adapt itself? The latter is the more reasonable supposition, as the milk, when analyzed and examined, is usually found to be normal. There is another fact which sustains this view, and that is, that if the child recover from the attack, and continues to nurse, it continues to grow also. In its restoration, the predisposition is lost, through the agency of external circumstances.

The following case is reported, because it will show not only how long the disease may be prolonged, but also that, during its existence, tubercular depositions may take place with those predisposed to phthisis.

CASE 4.—Mrs. H——, aged 24, of tuberculous diathesis, was attacked with stomatitis after the birth of her first child. She continued to nurse it, although suffering from the disease. In due time it was weaned, and she became pregnant again.

During gestation she suffered much, and continued to do so after parturition. This child soon died from the disease, and she improved, but did not wholly recover. She began to cough at this period, and, after a time, again became pregnant. The cough continued, as well as the stomatitis, and at her period, was delivered of her third child, which, though small, appeared healthy. When able to be removed, her husband came to this city to reside. The child was now a month old, and had an attack of what she deno-

minated the "thrush." Such was her deplorable condition, that I urged the instant separation of the child from the breast. There was cough, copious expectoration, hurried breathing, colliquative diarrhœa, and sweats, ulceration of the mouth, the fauces, the posterior nares, the labia, and even in the mucous lining of the nasal cavities. The emaciation was great, and the pulse was 130, and yet in this state of debility and prostration she suffered from hemorrhage from the nose, the lungs, the stomach, the uterus, and the bowels. Such were the material physiological symptoms. There were also all the physical signs of tubercles in the left lung, which doubtless contributed to the hemorrhage from those organs. These repeated drains, attended with copious discharges, soon wasted away her vital forces, and after the most faithful and efficient means for her restoration, with only temporary good, she gradually failed, and died from exhaustion.

The important feature in this, and the case which follows, was the tubercular deposits, occurring after the dynamia had been expended.

I have seen six fatal cases, analogous to the last, within the past seven years, and because I have seen no report of similar instances of this disease, I have given these that the profession may determine whether or not it is more malignant in these parallels of latitude and longitude, possessing similar geological characteristics. In the above case, and in all others of a hemorrhagic tendency, I have not seen the spongy gum, nor the bleeding, to proceed from them. Nor have I seen in any of these aggravated cases, ecchymosis, nodosities of the bones, ostalgia, or other special diseases of the bones; no foul, external, ulcerous manifestations nor phenomena common in scurvy. I will repeat, here, that the physiological state of the blood is destroyed, by disease of all, or nearly all, of its constituents. In stomatitis, the blood is changed in its due proportions first, then becomes subject to the consequences which that change may produce in its organism. In this lies the difference, that the blood in the former is diseased by the presence of some foreign product, or poison, or it dies from some morbid change in itself. In the latter one physiological requirement is met at the expense of another, and not that the materials themselves have undergone a morbid change. When discussing the propriety of separating the child from the breast, that course must be determined by the exigencies and necessities of the case. It must, on behalf of the child, be regarded as a dernier resort. On the one

hand, the mother may suffer seriously, nay, fatally, if lactation be continued and protracted, while on the other, the child's health and life may be offered up a sacrifice to save the more valuable life of the mother. The question to be answered, before adopting either course will be: can the mother be sustained, provided the child is permitted to nurse? If the child be not alienated, until the mother is beyond the reach of remedy, manifestly it will then avail nothing.

Then, again, if the mother retains a sufficient share of the vital forces, which, with the aid of remedial measures, may enable her to continue to nourish her child, and if, with these probabilities, we abandon the child to such artificial nourishment as may be provided, it may suffer and die, when the lives of both might have been saved. This is a grave moral question, and must be determined by the character of the case—its complications, and the means afforded for sustaining the child. Of course, there will be less hesitancy when a substitute can be obtained in a wet nurse, whose lacteal secretion is healthful, and of appropriate quality to the age of the child.

The following interesting case was reported by me, in 1851, but as it had a limited circulation among the profession, I propose to embody it in this report.

CASE 5.—Mrs. W——, of scrofulous predisposition, and advanced to the seventh month of pregnancy, had been laboring under stomatitis for three weeks before advice was taken. The tongue, the lips, the cavity of the mouth, and the fauces, were thickly covered with ulcerated patches. From the difficulty of swallowing, it was also manifest that it had proceeded downward along the lining of the œsophagus, and it was just as apparent that the mucous coat of the stomach was also seriously involved. There was much suffering, upon deep pressure, in the epigastric region, and food was rejected immediately upon swallowing it. The symptoms pointed to a diseased condition of the cardiac orifice.

There was at this time some constipation of the bowels. After a time, from the change in the voice, together with a sense of tightness of the part, and stiffness of the muscles of the neck, it was evident that the larynx and trachea were suffering also.

There was slight cough, with a muco-sanguineous expectoration, and, upon retiring to bed, the semi-recumbent position was chosen, to favor inspiration, in which position the head was thrown back. There was slight dulness, upon percussion, over the entire thoracic

surface. There was feeble respiratory murmur, owing to the difficulty in the passage of air through the thickened walls of the larynx, aided, doubtless, by the preternatural smallness of the chest.

She had now arrived at the eighth month of her pregnancy, the previous month having been spent in the foregoing developments. The symptoms now assumed a more grave character; the cough was constant and harassing; the sputa thick, tenacious, and slightly sanguineous; wandering pains through the chest; respiration difficult at intervals; dulness over the entire thoracic surface, particularly manifest in the superior sternal, and the right clavicular regions.

There was bronchial respiration, but no vesicular murmur; irritability of the stomach so great as to reject food, drink, or medicine. The dejections showed a large admixture of thick, tenacious mucus, similar to that expectorated.

About the middle of the eighth month, the following were the symptoms: There had been a large discharge of pus, upon coughing; pectoriloquy in right infra-clavicular region; the ulceration had extended to the posterior nares, followed by alarming epistaxis, doubtless from the destruction of vessels in the progress of ulceration; the irritability of the stomach continues as before; colliquative diarrhœa and hectic fever; cough persistent; sputa purulent and muco-purulent.

Her confinement, which was now close at hand, was looked forward to as an event which would close her sufferings. All the symptoms continued in an exalted form up to this period, when uterine contraction came on, and her labor was concluded in two hours from the first evidence of uterine effort; was easy, and followed by but little loss in discharges.

She, however, began to sink rapidly, and in eight hours from the delivery of the child, she died. The child was less than an average, but appeared healthy. In a few days, however, as I learned, it sank rapidly, with similar symptoms to those of the mother. The treatment was such as would naturally suggest itself, but the irritability of the stomach opposed a serious difficulty to the prosecution of any treatment, or a fair trial of any remedial agents internally.

This case, the history of which has been condensed, so as to show, as far as possible, its chief features in its progress, was one of much importance, as it exhibited great rapidity in the development of the lesions upon the different organs and structures, and

the fatal results of their spread and extension. In the early months of her pregnancy she enjoyed good health. The tendency, however, to tuberculosis was so great, that the excitement, attendant upon the attack of stomatitis, seemed to develop the pulmonic symptoms with remarkable rapidity.

In other cases, and in other diseases, also, the occurrence of pregnancy will often hush to quietude, for the time being, the morbid tendencies; but in this case, however, the excitement attending the invasion of this affliction, awakened the dormant predisposition into activity and action.

Case by S. M. Bemiss, M. D.

Louisville, Kentucky, March 26th, 1858.

Dr. M'Gugin—

My Dear Sir: A letter from Dr. Bartlett, of your place, requests me to communicate to you my observations of stomatitis materna. It has been my lot to have witnessed many cases of this disease, and to have made critical *ante-mortem* investigations—no opportunity of *post-mortem* examination having been afforded me. I regard the disease as, in its nature, a form of blood depravation closely analogous to the aphthous diarrhœa of phthisis, and to a form of disordered bowels which was so common in the broken-down constitutions of our Mexican volunteers, and which was known as the "Mexican diarrhœa." So far as I now remember, very nearly, if not quite all the cases of "Mexican diarrhœa" which have fallen under my notice succeeded attacks of dysentery, or acute bowel disorders, or fever; this has likewise been the case with stomatitis materna in my practice. In a very large majority of instances, the affection has followed in the wake of diseases which have left the constitution vitiated and enfeebled.

I think it likely that a similar precursion of malarial diseases has led Drs. Shanks, of Memphis, and Coventry, of New York, to assign to the disease a malarial origin. It is undoubtedly more common during, or subsequent to unusual prevalence of malarial diseases, at least such is my observation. Its most common subjects of attack are persons of lymphatic or strumous constitution. This rule has, in my observation, scarcely admitted of an exception. I have not been able to agree with some excellent practitioners, that it was confined to certain localities, without regard to malarial

or other influences. One practitioner of large experience, and living on the banks of a stream prolific of intermittent disease, says he has never met with but one case. I think this is due to the fact that his population are, to a remarkable degree, surrounded by circumstances of life calculated to avert constitutional vices; they are agricultural, industrious and temperate, and none of them either so rich or so poor as to have constitutions either enervated by luxurious indulgences or vitiated by want. And moreover, I cannot but think there is an error of memory in his statement. My practice joined his, and for years I was scarcely at any time without a case of this disease under treatment, and sometimes five or six.

Since I have been in Louisville, now four years, I have treated three cases, one succeeded an attack of dysentery, another of autumnal fever, the third of chill and fever.

I then regard the disease as one of blood depravation, and have generally construed this condition to be either one of impoverishment essentially, or associated with an impoverished state of that fluid.

It has always been associated under my observation with a most abundant lacteal secretion, and this secretion giving proof of healthy characteristics under the microscope, by chemical tests, and also by the invariably thrifty condition of the nursing child. Another remark which my observation leads me to adopt as an aphorism, is that the disease never *originates* except during lactation; it may exist during every stage of pregnancy as a continuation of a former attack, but primary incursions of the disease I have never seen appear, except in a very few instances previous to delivery, and then so late in utero-gestation that mammary secretion had commenced. The disease most commonly manifests itself from one to two weeks after delivery. I have made numerous examinations of urine from patients laboring under this affection, and have invariably found them abounding with urates and the different specimens presenting a remarkable uniformity. I have in my possession many analyses of urine, and some rather elaborate, but cannot lay my hand on any but the one I send, which is very imperfect. If they would be of any particular service, write me word, and I will endeavor to find and forward them.

My treatment has been alteratives, chalybeates, local anæsthetics and astringents—lastly, taking the child away and stopping the

secretion of milk. Alteratives, I have found useful only in the very incipiency of the disease, before diarrhœa or gastric irritation had manifested itself. There is, previous to the declaration of these symptoms, a brief period during which the patient complains of a general malaise, is somewhat feverish, has abundant flow of viscid saliva, with some enlargement and tenderness of the sublingual glands, and loaded tongue; at such times small doses of calomel or blue-pill, or mercurial chalk and rhubarb, have always benefited my patients. In several patients I have seen apparent almost complete recoveries, followed by a recurrence of the above symptoms, and fresh aggravations of the disease, in these instances, repetitions of the alteratives were always attended by marked benefit.

Chalybeates I have given in every stage of the disease, and almost every form. I think, however, the ammonia-ferric alum in five grain doses, in cinnamon or mint-water, has been most acceptable and serviceable; though in the largest majority of cases, I have used the sulphate either in pill with extract of gentian, or in solution with dilute sulph. acid. I think the iron answers a double indication—that of counter agent to the state of anæmia present, and that of diminishing the lacteal secretion.

The local anæsthetics have always brought comfort, if not benefit, to my patients, in that state of perpetually harassing gastric disquietude of which almost all complain; from five to ten grains of subnitrate bismuth in combination with pulv. charcoal, magnesia, or bicarb. soda, will add greatly to the patient's comforts.

When the aphthæ have traversed the intestinal tube, and obstinate diarrhœa exists, I resort to astringents, the chalk mixture, the acid mixtures, terebinthinates, vegetable astringents, but above all the nitrate of silver in pill, with a little opium and extr. gentian; the worst case I ever saw, to recover, did so under the use of nitrate of silver in solution, with albumen of eggs and gum-water for diet; if all fail, taking the child from the breast is, I believe, a never failing cure, if the disease have not progressed so long that incurable lesions of the bowels have occurred.

This sketch is imperfect and written amid frequent interruptions, and worse than all, written without access to my notes, which, in the confusion of changing offices, have been lost or mislaid; but if they are of service to you in any manner, I shall feel gratified.

Yours, respectfully,

S. M. BEMISS.

DR. BEMISS:—

The specimen sent contains a sediment of *urate of ammonia*, the only abnormal substance present; the fluid is acid to test paper, but not more so than is usual in the healthy secretion.

Very respectfully and truly yours,

THOS R. JENKINS.

LOUISVILLE, January 13th, 1854.

A Case of Stomatitis Materna. By W. S. BARKER, M. D.

Mrs. G., aged 26, of delicate constitution, was delivered of her second child, August 15th, 1857. She had suffered some from diarrhœa and gastric disorder, during the latter months of utero-gestation. She had a mild attack of stomatitis, while nursing her first child. I visited her, with Dr. Asa Horr, Oct. 24th. Her symptoms were as follows: Profuse diarrhœa; acid eructations; great debility, and a hot, uncomfortable feeling of the mouth and fauces. There were numerous small ulcers on the edges and under part of the tongue, and a tender condition of the cheeks and mouth. The difficulty began soon after her confinement; but she had delayed resorting to medical aid, in the hope that, as she had recovered from a previous, though milder, attack, she would also from this. The lacteal secretion was quite abundant, and the child seemed to be healthy. The urine was highly acid. As her illness lasted nearly four months, it would occupy too much space for me to detail, with minuteness, every particular of either the symptoms or the treatment.

A great variety of means were used, most of which seemed wholly ineffectual. At first an effort was made to check the diarrhœa with vegetable astringents. Tannin, gallic acid, and catechu, were given in combination with opiates, to relieve pain, and alkalies to correct the acid eructations. The discharges were only temporarily controlled. They would be less for a few days, and then return.

I observed, in the early stage of the disease, that when the diarrhœa was checked, the tongue and throat were worse.

In the second week of my treatment, the passages contained some blood, for which I gave acetate of lead first, and afterward an emulsion, containing oil of turpentine.

Nov. 20. Patient no better; inflammation and ulceration more extensive. The ulcers on the tongue were large and painful, and the interspaces of a bright red color. Deglutition difficult; no

appetite; much thirst; epigastric pain; diarrhœa copious, thin, and watery. She was very weak, and much emaciated. Although the milk was abundant, I insisted on the weaning of the child at this time.

At the end of the second month, all the symptoms were much aggravated.

The entire alimentary mucous membrane seemed to be ulcerated. The vaginal mucous membrane was also ulcerated, and the labia were sore and excoriated. There was an abundant discharge from the vagina. There were extreme debility, anorexia, hectic fever, etc. In the mean time, I had tried everything that I thought likely to afford relief. In the course of the disease, I administered tannin, gallic acid, opium, oleum terebinthinæ, sulph. zinc, sulph. copper, tinct. ferri, bismuth, soda, chlorate potash, cod-liver oil and brandy, and malt liquors. Having seen an article in the *American Journal of the Medical Sciences* highly lauding the subcarbonate of bismuth in "phlegmasia of the digestive passages," I tried that also, but found it little, if any, better than the subnitrate. I was quite discouraged, and no one will be surprised that my patient was also. I thought she must inevitably die. She was having never less than five, and often a dozen passages from the bowels daily. At this time it occurred to me to make a trial of glycerine. I gave half a tablespoonful five times a day, giving no other medicine, but an opiate at night. The result was beneficial, quite beyond my expectations. From the commencement of giving this remedy, the convalescence was marked and rapid. The evacuations were less frequent, pain diminished, the ulceration disappeared, the appetite returned, and, in fact, all the symptoms improved.

She had been unable to leave her bed for over two months; but ten days after beginning the glycerine treatment, she could sit up in a chair; in two weeks she was able to ride out, and a few days after I met her as she was walking in the street. She took the glycerine about three weeks, taking two or three ounces daily.

The question will quite likely arise in the reader's mind whether my patient was really benefited by the glycerine, or whether the disease having run its course, there was simultaneously a fortunate discontinuance of all very active treatment, and recuperation followed from the *vis medicatrix naturæ* alone.

I am firmly of the opinion that she would have died, but for the administration of the glycerine. At two periods during her recovery, she was without the glycerine, and three or four days elapsed

before I could procure it for her of the proper kind. At these times there was a tendency to relapse into the former condition, but all unfavorable symptoms disappeared on resuming the medicine.

The glycerine I used was that made by Mr. Price, of London, and it is much superior to any other that I have seen. It is said to be "free from the lead and earthy salts, and bad smelling volatile "fatty acids" of common glycerine.

As to *how* glycerine produces a curative effect in this disease, my opinion is somewhat conjectural. It seems to counteract the acid condition of the stomach and bowels, thus removing, I think, the principal cause of the disease. It appears to exert a peculiarly soothing effect on the ulcerated mucous follicles, and thus favor their healing. Its nutritive properties are well known, from its effect in phthisis. It never offends the stomach, as cod-liver oil does, and is not the least unpleasant to the taste. I hope it may receive a further trial by those who have severe cases of stomatitis to treat.

W. S. BARKER.

DUBUQUE, *Iowa*.

REPORT

ON THE

TRUE POSITION AND VALUE OF OPERATIVE SURGERY AS A THERAPEUTIC AGENT.

BY

J. B. FLINT, M.D.,
LOUISVILLE, KY.

"Chirurgo necessariam esse cognitionem Physices, Chimicæ, Logices, omnis (fere) ambitus medicinæ; neque solo manus exercitio veras chirurgas fieri."—HALLER.

REPORT ON THE TRUE POSITION AND VALUE OF OPERATIVE SURGERY, AS A THERAPEUTIC AGENT.

THE Committee appointed to report upon *The true position and value of Operative Surgery, as a therapeutic agent*, respectfully submit the following views of the matter referred to it.

The terms of the reference, or inquiry, seem to intimate that, in some quarters of importance enough to interest the body of the profession, misconceptions exist respecting the relative importance of operative surgery, as well as abuses growing out of them, which can be, and ought to be removed, by an intelligent and impartial exposition of its merits and perversions.

Such is undoubtedly the fact; and there can hardly be a better service rendered to the profession or to the public, than by defining the true position of this branch of our art, and inculcating a just and discriminating estimate of its services.

In the first place, then, the true position of operative surgery, among our various healing ministrations, in point of time, is secondary. Indeed, we may say, in regard to almost every instance of its exercise, that its place is among the "last resorts" of practice. Not until we have exhausted all other means of defending life or member against the attacks of disease, are we warranted in resorting to those terrific processes which seldom save without pain or danger somewhat commensurate with their expected benefits.

How many blessed results have followed from a deference to this principle of order in the employment of curative agencies—how many sad ones from a precipitate disregard of it. "I never suffer longer with an aching tooth," says one, "than the time it takes to go to the dentist," and he is complimented, perhaps, as a very heroic and sensible sufferer. But long before his threescore and ten years have been numbered, his jaws have become toothless, his cheeks collapsed, his articulation impaired, and his very diges-

tion at the mercy of his dentist, who supplies a miserable substitute for those invaluable organs of mastication, which a little patience, warm water, opium or creasote—all of them legitimately prior to the operation—might have preserved for him through all the years of his life.

The example, if not sufficiently grave in itself, is nevertheless sufficiently illustrative of our position. Many a graver mutilation, with its perpetual but unavailing regrets, is incurred by a precipitate appeal to the "*ultima ratio medendi.*"

Secondly—in point of rank, dignity, undoubted claims to the consideration due to a scientific benefactor; it is equally true that mere operative surgery is *secondary* amongst the various ministrations in the department of practice to which it belongs.

The distinction implied in this statement, to be sure, on a superficial view of the matter, is not very clear or significant, inasmuch as the healing purpose of all such undertakings, even the most simple and menial of them, invest them with a common excellence which disarms critical comparisons. Nevertheless, they are far from being exceptions to that general estimate of all human efforts, according to which intellectual achievements maintain a superiority to such as are manual. The philosopher is preferred to the artisan, the man who investigates, reasons, concludes, to him who only executes.

Now, by the application of this familiar principle of discrimination, it would be easy to determine the relative rank or position of operative surgery, were it not the case that very few of its proceedings are so purely manual as in other arts. All of them, as the profession is now constituted, imply intellectual preparation on the part of the practitioner who legitimately undertakes them; while the most humble and inconsiderable of them are among the daily exercises of the most gifted, accomplished, and eminent men in the medical world. There is now no ignorant barber introduced to execute the prescriptions of the learned, but fastidious surgeon, nor is the most exquisite dexterity in manipulation supposed to be incompatible with the highest culture and science in the healing art. Under favor of this complexity of surgical offices and character, a perverse bias of the times has asserted for the operative department of it, that false and arrogant position which has provoked the corrective animadversions in which we are at present engaged.

Because wise and experienced surgeons, as a part of their professional duty, perform various surgical operations, a puerile logic

concludes that they are therefore wise and eminent, and an equally puerile presumption aspires to a similar eminence by a reckless imitation of their practice, without any participation in the science, the experience, and the resulting discretion which qualify and guide the hand, as they constitute the real excellence of every true surgeon.

If any man in our day and generation, has achieved true surgical fame—that enduring renown, we mean, which is to be distinguished from notoriety, éclat, and all its other glittering counterfeits—that man was Sir Astley Cooper; but how little do we think, when meditating upon his professional character, of his exploits in the amphitheatre; how much of his profound and practical views of pathology, of his masterly delineations of disease, of his subtile and conclusive diagnosis, his singular merits as a teacher of his art, and his enthusiastic devotion to the culture of its elementary department, even in the declining years of his life? These, and such as these—matters of thought, of science, of experience—determine our estimate of the great British surgeon of his day; while that boldest of all operative exploits, his ligature of the aorta, is either quite forgotten, or remembered only as a blemish in his remarkably exemplary career. And so, also, of one of the baronet's most eminent contemporaries, chiefly distinguished, indeed, in another sphere of professional service—who reckons among the higher merits of James Blundell, among the things that confer upon him his title to a place in the first rank of British obstetricians—that masterpiece of heroic surgery, his extirpation of the uterus—an operation which his own mature judgment did not approve, and of which he declared to the writer, while exhibiting, with pardonable vanity, the specimen in evidence of the exploit, that "he should never advise nor undertake it again."

But it is needless to multiply illustrations of the great truth that the acknowledged masters of our art have become so, and secured a corresponding renown, not by their daring and successful use of the scalpel; but by their careful observation and study of disease, and by discriminating and cautious, rather than heroic methods of treating it.

Nevertheless, as we have already intimated, the popular appetite for whatever has the semblance of adventure—if seasoned by a trace of the shocking, it would seem to be so much the more palatable—conspiring with unprofessional practices corresponding thereto, on the part of medical men, has threatened to reverse this

rational and established order of surgical distinction, and to place the handicraft of the art above the intelligence and experience on which it is really dependent for all its value and respectability, and without which operative surgery now has no title to pre-eminence over the barber butcheries of the dark ages. Very certain to demoralize and degrade the profession, must be such a perverse estimate of its therapeutic agencies.

And this has already proved to be the fact, to such an extent, that besides involving individual practitioners in the most sad derelictions of faith and duty, it has even tainted the policy of our medical schools, and in their electioneering circulars, reduced professors to the level of advertising empirics, parading operations and operators like the programme of a dramatic entertainment. It has inflicted a vast amount of needless and perilous suffering upon unwise or credulous persons, and has deluded society and the press into an unconscious participation in abuses at which both would be shocked, if they were only undeceived. In justification of its excesses it has called in aid the most sophistical and dangerous of medical maxims—"the graver the malady the severer the remedy"—and does not scruple to act upon a principle unknown to the ethics of legitimate medicine, but orthodox and accepted by quacks, that of employing the most desperate measures, in the blind and fortuitous alternative that they will either "kill or cure."

An enterprising young doctor, or a less excusable old one, impatient of a tardy recognition of his merits, is too ready to seize upon such a method of securing distinction, without the labor and study which are the inexorable conditions of its legitimate possession.

In imitation of equally unscrupulous bloodshedders on a larger scale, he will conquer success by a dashing exploit at the sacrifice of the decorum or even the integrity of his calling.

Some unfortunate subject of disease or deformity, the removal of which will involve bloodshed and violence enough to give eclat, is either deluded or purchased to be the victim of the occasion—the sacrifice seldom, indeed, being that of life, but too often the endurance of unnecessary suffering, and the distress of being made a spectacle in moments of agony. All things being arranged with a view to the greatest effect, our hero of the scalpel, with real or assumed sang-froid, operates himself into a surgeon in the course of a few minutes, to the admiration of the students and the astonishment of unprofessional spectators.

In another hour, a suitable notice of the achievement is prepared for a popular newspaper; a specimen of high surgery is duly announced to the world, and Dr. —— may flatter himself that he is on the high road to fame and fortune.

Half the temptation to these unprofessional performances, as well as to all forms of heroic surgery, would be removed, if the public mind could become disgusted, as it ought to have been long ago, by the newspaper notices which form an essential part of the fashionable operative surgery of the times.

The shallow pretext for such improprieties is, that they make the public acquainted with sources and means of relief for unmanageable ailments. "Is there not balm in Gilead—is there not a physician there?" and "shall not suffering men and women be informed who the physician is, and where?"

With trifling variation in circumstantial details, all these surgical glorifications are very much alike. They begin by puffing the performance; but soon pass to the performer.

The signal beneficence of the achievement must not fail to be commemorated; while the hydra has found his Hercules, his victim, a poor, unfriended fellow—being neglected by the priest and Levite of the profession, has, at the same time, found his Samaritan—a tender heart has prompted the skilful hand, and it is surely meet that such a benefactor should not be altogether unnoticed in the publication of his great exploit. The notice, therefore, concludes with some modest allusions to the hero of the story—his noble qualities and manifest destiny—until the spirit of eulogy, warming with the disinterestedness and heroism of its subject, cannot refrain from arrant compliment, and pronounces him, in terms happily chosen indeed for such an occasion, but in miserable taste for any other, "an intrepid surgeon," a "bold operator," a "fearless practitioner." Bold, intrepid, fearless! We never hear these epithets applied to a surgeon, but we shudder at once, into the utterance of the poet's exclamation—"Fools rush in where angels fear to tread," or, forgetting for a moment, the intrinsic seriousness of the subject, the ridiculous element of it becomes paramount, and the vaunted *bravery* of the doctor becomes allied to that of the Christmas hero, so familiar to our youthful reading, who in the course of the accustomed festivities of the day—

> "Put in his thumb, and pull'd out a plum,
> And cries, what a *brave* boy am I."

But, in truth, it is hardly excusable to forget, even for a moment, the gravity of the subject. The offence is so gross, and is, moreover, becoming so common, of parading newspaper notices of surgical operations, that it should never be referred to but in terms of most unequivocal disapprobation.

They are always in spirit, and generally in expression and form, essentially empirical; and we are sorry to say, that, in almost any quarter of the land, we could offer you specimens, commemorative of men who claim an honorable membership, not to say of eminence, in the medical profession, that differ very little from the cards and certificates of notorious quacks, except that the latter are honestly paid for, according to their true character, as advertisements; while the former assume an editorial disguise, affect disinterestedness that is not real, and so, are not only indecorous puffs, but counterfeits also.

The highest judicature of American medicine thus utters its condemnation of them in the second chapter of its code of ethics: "It is derogatory to the dignity of the profession to resort to public advertisements, or private cards or handbills; to publish cases and operations in the daily prints, or suffer such publications to be made; to invite laymen to be present at operations; to adduce certificates of skill and success; to boast of cures and remedies, or to perform any other similar act." "These are the ordinary practices of empirics, and are highly reprehensible in a regular physician."

Honorable practitioners, in all parts of the world, recognize the propriety of these prohibitions, and generally conform to them. They cannot be disregarded, consistently with a just sense of the dignity of our calling. To a mind truly alive to its claims, as a learned and liberal profession, such indecorous solicitations of patronage would be as revolting as the idea of Sir Isaac Newton peddling his *Principia*, or of Washington Alston, or Sir Joshua Reynolds, employing the posters of a modern itinerant daguerreotypist.

Another form of temptation, not without its influence in determining unjustifiable operations—more sordid and revolting than the illicit notoriety we have just been considering, but deriving its power from the same exaggerated notions of the importance of this portion of practice, is the opportunity they offer for the exaction of exorbitant charges and remunerations. Stamped with a fictitious value, bearing the character of fancy articles, like others of their kind, the price of such services has no limit, but the caprice

and artifices of those who dispense them, and they present seductive occasions for one of the most subtile forms of knavery.

Doubtless, the species of professional services we are now considering, is entitled to more ample remuneration than the ordinary routine of medical duty. To say nothing of the expenditure involved in the purchase and preservation of instruments and apparatus, which must be borne by one who devotes himself to operative surgery, and keeps himself prepared, as he should do, for its various emergencies, the performance of operations is generally attended with much consumption of time, with many incidental cares, that cannot be charged, and often with participation in scenes which tax the sensibilities of a man, and awaken his anxieties to a degree unparalleled in all the trying experiences of human life. In our own practice, the latter particular has always entered largely into the considerations which determine the amount of our fee for any particular operation—a determination which it is not always easy to arrive at in a manner satisfactory to one's sense of justice and propriety, even when the case is uncomplicated by any misgivings as to the pecuniary ability of the patient.

Time and anxiety are the two elements that constitute the basis of our claim for what is purely operative in the treatment of any case. Sometimes one predominates, and sometimes the other; and again both may conspire, and justify the highest grade of remuneration. We have lost hours, for which we ought to be paid, in persuading a timid or obstinate child to submit to excision of enlarged tonsils; but when once the little section is made, we have no more care, except, perhaps, for the rust that may gather upon the complicated instrument. In five minutes we have placed a ligature upon the carotid artery, but days and weeks, even, have not relieved us of the anxiety connected with the possible disasters of the operation.

But, to return; there is a limit to the difference we make in our pecuniary appreciation of our services as operators and prescribers—which it is not easy to fix in the abstract, but about which we should not often err, if our judgments were not perverted by the prevalent error we are controverting. Let me illustrate this phase of its absurdity, by an example supplied in our own recent experience. Two patients presented themselves about the same time, with disease of the eyes. One was nearly blind, and in the other, vision had begun to be seriously impaired. Both had been sent to us as cases of cataract.

More careful investigation, or a better appreciation of the phenomena of the case, in the one least blind, convinced us that his disease consisted in a morbid condition of the retina, threatening amaurosis. He was dismissed with instructions to pursue a certain course of regimen and medication, which, we were happy to learn, in a few weeks relieved him from a disease, which a month or two longer, waiting as he had been advised, for the development of the supposed cataract, might have afflicted him with irremediable blindness. The other patient was directed to return to his lodgings, and submit himself, for a few days, to the antiphlogistic regimen, after which, with the assistance of a medical friend, the opaque lens was exposed to the aqueous humor by the use of the cataract needle. Solution went on favorably and fast, and in about the same time with his fellow-sufferer, he too went his way without need of the friendly guide who had conducted his steps hither.

Now, who shall undertake to say of these triumphs of the healing art—for such they truly were, and neither of them the individual glory of the practitioner—that the one was more excellent or meritorious than the other? that evening investigation, with its accurate conclusions, and restorative counsels, than the morning operation, admirable as it is, alike in its simplicity and its beneficence. To the parties, the advantage was respectively the same; both may be said to have been rescued from impending blindness. To the consciousness of the practitioner—if we may be pardoned the personality of the reference—there was no difference in the dignity or importance of the two performances. He felt that he was doing the work of a *master* in both, that of a *hero* in neither, and assuming the same professional responsibility in the one, as in the other. Where, then, is the warrant for that appreciation of surgical service, common, we think, to the profession and the public, according to which a man of ample fortune would think himself heavily taxed by a twenty dollar fee, in the first case, but would make no complaint, if charged an hundred, in the second; where, but in that fancied superiority accorded to the manual exercise of our art, which is not only intrinsically absurd, but prolific, as we have seen, of professional misdemeanors, too often finding their culminating point in that most detestable of sins—medical extortion?

At the best its tendency and effect is to inspire a passion for operating—an apparent love of the bloody and shocking portion of the surgeon's calling. When such a passion has taken posses-

sion of a practitioner, he has become a dangerous man. A more decided misfortune can hardly befall a community than to have him settle among them. The utmost vigilance of the judicious, conservative physicians of the place can scarcely preserve a multitude of their fellow-citizens from needless torture and mutilation. Woe to that harmless and venerable tumor, that has held its place so many years, an inoffensive feature of its contented wearer. It has now become intolerable, under the light and knowledge of such affections disinterestedly communicated by Dr. Hackem, and one of his dashing operations soon transfers it to a jar of alcohol in some conspicuous part of his premises, to be exhibited as a trophy, or referred to as a decoy piece, in the further pursuit of similar game. Has any young lady grown up with strabismus, or one of her beaux become frightened by the spermatorrhœa doctors, by specious appeals to the vanity of one and the virility of the other, he soon persuades them to submit, at once, to the "ultima ratio medendi," in the assurance that, from the ministrations of his knife and his cautery, he will dismiss them respectively, a restored beauty, and a prolific gentleman.

"I do not know," says an eminent British surgeon, writing to the present reporter, "any evil that can befall our noble profession greater than the indulgence in this passion for the knife—a practice which not only sustains and cherishes a barbarous principle of surgical treatment, but tends to alienate the mind of the surgeon from the study and contemplation of agents possessing a curative power."

The influence of this surgical "cacoethes," in determining unnecessary resort to the knife, in private practice, cannot easily be ascertained and exposed; but we believe that a comparison like the following, which is made on authority every way reliable, applied to other public institutions, would frequently exhibit similar results. In some hospitals dramatic surgery seems to be the common order of the day—from the advertisements and bulletins issued by their "faculty," one might conclude that "*the clinic*," and not the quiet, humane succor of the sick, was really the *final cause* of their establishment.

"I have endeavored to show," says an intelligent medical writer in London, "that there is no standard of surgery in this country; that a disease that is cured in one hospital is removed in another. In St. Bartholomew's Hospital, containing three hundred and eighty surgical beds, there are fewer operations than are performed in another hospital containing about ninety beds only; but the chief

surgeon in that hospital, is an eminent and a dexterous operator.' Now, we do not often witness either of the professional improprieties at which we have glanced, in other departments and forms of practice—few men electioneer, advertise themselves, or make an exhibition of their art, or practice extortion, while treating ophthalmia or synovitis; and we may, therefore, fairly charge them to a vicious appreciation of that form of practice in which they so frequently present themselves.

In truth, there are few things that can bear to become the favorites of mankind. The pets of the world have generally been its pests. Unfounded partialities soon exalt themselves into idolatries, and curse their votaries with many impositions. Like aristocracy in society, operative surgery has become an upstart in medicine, and has trodden underfoot the wholesome regulations of its own community.

Proceeding, now, to the second branch of our inquiry—"the true value of operative surgery, as a therapeutic agent"—it is pertinent to remark, at the outset, what a discriminating glance at the whole subject discovers at once; how few of what are called the "great operations," those which were famous in their day, and conferred some form of notoriety upon their originators—how few of these, out of the swelling catalogue to which they belong, *should* really be regarded as therapeutic agents at all. How long should we retain among the articles of the materia medica, a medicinal agent that, in the hands of competent practitioners, as frequently did mischief, and as seldom did good, as many of these vaunted operations?

When we have named well-considered amputations, the removal of certain tumors that have become pernicious, by their mechanical action, operations for cataract, calculus, and hernia, in the comparatively few instances of this affection, which modern means of relaxation have left to the knife—there remain very few of the "*opera majora*" of our art, as they are called, which fairly fall within the terms of our present inquiry. Operations on the great thoracic trunks—almost invariably fatal—skinning and stitching by the hour, according to geometrical configurations, infinitely varied and ingenious, under the plausible name of plastic surgery, dividing muscles at the rate of "forty-two in twenty-four hours," in illustration of the safety of hyperdermotomy, desperate intrusions into the great cavities of the body, in search of tumors or obstructions, including our recent New York heroism, within the larynx, resec-

tion and exsection of bones, the latest fashionable pseudo-surgery —these doings constituting, in the aggregate, the great modern field of heroic surgery, are in no sense therapeutic agents, except it be in some such equivocal or diplomatic sense as that in which the terrible battles of the Crimea are said "to secure the peace of Europe." Not a few of them deserve to be called, as Mr. Liston designates one of their number—section of the tongue for the cure of stammering—"*rascally operations.*" Many others, originally undertaken in a spirit of commendable enterprise, have long since been forbidden by the predominance of disaster attending their performance by the most competent practitioners, while the residue are beset with such difficulties as to their propriety, in particular cases, as to perplex the wisest surgeon, and forbid them to be meddled with by the forward and daring imitator. A year or two since, in a distant city, one of the great exsection exploits was performed. A pamphlet was published, as a substitute for the newspaper notice, announcing the achievement, exhibiting an engraving of the unfortunate bone, and otherwise done up so as to make the most of it as a contribution to the notoriety of the operator. Not long since, the subject of this heroism—a poor, ignorant, friendless being—and how damnably significant it is that the subjects of these surgical exploits are generally such—strayed westward, and presented himself, as a sort of medical curiosity, to the practitioners of that region. Did any one, who understood the meaning of the word, conclude that any *therapeutic* measures had been employed in behalf of the mutilated member of his body?

But, what then is to be done, we may be asked, with all the learning and labor, the science and skill, confessedly involved in these non-therapeutic operations? Are they all good for nothing; and may we epitomize, with advantage, the three ponderous octavos of the inexhaustible Velpeau? By no means. Those precious volumes are magazines of information on the whole subject of operative surgery as it is, such as few other sciences can boast, and such as no other surgeon than their author could supply, and not a chapter or a section can be spared, unless it be some of the egotism and vanity that have found their way into the work on this side of the Atlantic. No one is more ready, however, than this illustrious author to recognize the distinction I have indicated between the commendable and the objectionable operations. "I have often adverted," says he, in his admirable preface, "to processes long since forgotten, or justly proscribed; if I have also not omit-

ted a crowd of recent inventions, which may not have any value in themselves, and that science can derive no advantage from, it is because, on the one hand, there is no method, however extravagant we may suppose it to be, which does not run some risk of being reproduced at some future time by some new inventor, and that, on the other hand, it is indispensable to enlighten students, not only on what they ought to adopt, but also on what they ought to reject, when the subject is the contemporary history of assertions and opinions that they are every day accustomed to hear unjustly praised or censured."

Somewhat of the same cautionary purpose was doubtless intended to be answered by the interesting volume lately published by the late President of our Association, composed of extraordinary surgical operations—the "*mirabilia* of operative surgery," as it might well be designated. With such a purpose in view, the bare rehearsal of these heroisms may render a higher service to their readers than merely ministering to an appetite for the marvellous or bloody.

It is quite as necessary for the navigator to be acquainted with the rocks and quicksands, as with the harbors of the coast, and such publications, fallacious and futile as guides, may be infinitely valuable as beacons. Have we not seen how liable we are to make shipwreck of professional integrity and honor, on these very reefs, borne on to them by the treacherous currents of vanity or greed, or seduced thither by the syren blandishments of popular applause? and should we not value, as a seaman would in similar perils, those charts which designate the risks, and warn us of the dangers of the way? Truly we may say—continuing our nautical imagery—that the surgeon's experience is often like that of the navigator of Ithaca—"*Incidet in Scillam, cupiens evitare Charybdim.*" It is death, on the one hand, by disease, or death on the other, from the knife, between which, or in most trying alternative of which, he must often determine his course. Let us have all the guidance we can, whether positive or cautionary, amidst the perplexities of such professional experience, and especially, let us see that the judgment be not misled by specious pathological doctrines, nor dazzled by the éclat attending great operations. The old aphorism of Celsus "*Melius anceps quam nullum remedium,*" while its counsel is too vague to relieve the scrupulous practitioner, affords a dangerous latitude to the presumptuous, and, in fact, is cited, as we have seen already, in justification of the most unwarrantable proceedings.

But little, if at all better, are tables of statistics, the expedient of modern numericalism. "Statistical tables of success," says M. Piorry, "taken in mass, without a minute anatomical detail, and a particularization of each fact, expose whoever applies them to the strangest deceptions."

Velpeau, the leading continental surgeon of our time, and one who would not be suspected of backwardness in resorting to operative measures, reasons out an exemplary conservatism in the preface to his great work, concluding with the precept—"If it be just to say with Celsus, '*melius anceps*, &c.,' it is also just to say, better let the patient die than to kill him. In fine, it is better to wait for death than to run before him."

Some late numbers of the *Bulletin of the Imperial Academy* of France, have given a copious record of a discussion on the subject of ovariotomy, which occupied several meetings of that learned body, and called out the opinions of most of the eminent surgeons of Paris, not only upon that particular operation, but upon the principles which should govern the practitioner's action in that class of desperate maladies to which the one under consideration belongs. It was gratifying to observe the prevailing tone of caution and conservatism that characterized that discussion. It insisted upon a *therapeutic probability* as the only justification of serious operations, and gave no countenance to what is adventurous and experimental in the great emergencies of practice.

This is in harmony with that true surgical progress, which is dispensing with, one after another, the dangerous operations, either substituting milder proceedings of equal therapeutic efficacy, or resting with composure and hope on that "masterly inactivity," which is often the seal and assurance of consummate professional ability and integrity.

A beautiful illustration of this ameliorating progress of our art, is furnished in the history of the treatment of aneurism. How comparatively safe and inoffensive was the method introduced by Hunter, in place of that pursued by his professional seniors. But the Dublin surgeons of the present century modified the proceeding into an almost harmless one, and quite as effectual, in the most frequent forms of the disease, while, even now, are going on, under the hands of a distinguished British operator, investigations and experiments, suggested by one of the occasional modes of spontaneous cure, which promises to render the most unmanageable forms of that terrible malady amenable to methodical manipulations, and

which justify the hope that hereafter we may treat aneurism with more success than at present, dispensing altogether with a bloody operation, by which an injury is necessarily inflicted on the vessel, often attended by little less hazard than that involved in the disease itself.

Let it not be thought that we are disposed to undervalue operative surgery, either as to the frequency or importance of its interpositions, in the treatment of disease. While we repeat, that very few of the "major operations," as they are called, are undoubtedly entitled to a place among the legitimate resources of the healing art, let us bear in mind that no such doubt or reservation applies to that great class of professional services, unfortunately denominated "*minor surgery*." We say unfortunately, for the diminutive epithet has thrown into secondary and subordinate relations, professional doings of primary importance, and completely reversed the true appreciation of their merit. It has often happened that the discharge of deep-seated accumulations of matter has called into requisition higher surgical attributes, than many an amputation; and it would not be surprising to find a practitioner blundering over a phymosis, who would perform the Cæsarean section as well as Dubois himself.

A practitioner rises from his bed, at the call of a patient with protracted retention of urine. Taking with him the simple implement of relief, he hastens alone to the scene of distress, and in a few minutes converts it into one of ease and grateful repose, his timely interposition, it may be, having averted a catastrophe among the most fatal of pathological lesions. But he has only practised a "minor operation"—he has only introduced a catheter!

On the morrow, he performs, by appointment, one of the great operations. The invitations have been out as long as for a fashionable party. A crowd of curious spectators are assembled in an apartment reeking with the array and circumstance of dramatic surgery. Some deep-seated morbid growth, or chronic ossific disease has met the eye, and fired the ambition of the operator. The unfortunate subject of it walks into the room and disposes himself upon the table, with a pretty good appearance of health and strength, but is removed, when the performance is over, a bleeding, mutilated, exhausted being, with some uncertainty as to his power of reaction, but much more as to the ultimate and permanent eradication of his malady. Now, which of these two performances, that of the night, or that of the day, is most worthy to be regarded as

an exercise of the healing art? Which of them best illustrates the true value of operative surgery? Nay, if the former be, indeed, entitled to the name and merit of surgery at all, is not the latter as fairly entitled to be esteemed and called its counterfeit? He had *only* introduced a catheter, forsooth! and let us remark, in asserting the dignity of minor surgery, that passing the catheter, under the difficulties that often attend that proceeding, is one of the highest efforts of surgical art—requiring science and address, and ingenuity and determination, and patience and gentleness, all of them fundamental elements in surgical excellence, an infinitesimal portion of which will suffice to enable a bold operator to hack out a jaw-bone or extirpate a uterus with eclat.

It would be easy to multiply instances that would furnish an antithesis as pointed and significant as that just presented, and vindicate the superiority of many of the simpler operations over those that are showy and dangerous, and, too often, fruitless.

But, instead of extending our remarks, which have already transcended the limits we intended to observe, we conclude by presenting the most material points of our report, in the form of a few concise propositions in which we hope for the ready acquiescence of those who may hear or read them; but for which we do not invoke any action, in the form of votes or resolutions, on the part of the Association.

1. The true position and real dignity of all therapeutic agencies is the same, determined by intrinsic and not accidental considerations; and operative surgery has no rightful pre-eminence, in this respect, over other sections of practical medicine.

2. There are *pseudo-surgical*, as well as *vero-surgical* operations—the latter being such only as are undertaken with a therapeutic purpose and *probability;* and if any of these confer more distinction upon him who performs them, than others, they are such as are most eminently beneficial to the subject of them.

3. Of this character are not, in general, those which constitute the staple of what we have termed "dramatic surgery," denominated also "heroic" or "exploital" surgery, and these performances, therefore, should be scrutinized very carefully before they are reckoned among the legitimate agencies of our art, or allowed to become the criteria of professional ability or merit.

4. The fascinations of "dramatic surgery" are dangerous to professional morality and mischievous to society, and we should

endeavor to replace them in ourselves and the public, by just and rational views of the operative proceedings of our art.

5. Under the designation of "conservative surgery," there is at present an endeavor at reforms in operative surgery, which commends itself, most urgently, to the co-operation of all wise and conscientious practitioners.

Respectfully submitted by

J. B. FLINT,
Chairman.

A METHOD

FOR

PRESERVING MEMBRANOUS PATHOLOGICAL SPECIMENS.

BY

R. D. ARNOLD, M. D.,
SAVANNAH, GA.

A METHOD FOR PRESERVING MEMBRANOUS PATHOLOGICAL SPECIMENS.

TO THE COMMITTEE ON VOLUNTARY CONTRIBUTIONS, DRS. BOHRER, FLINT, AND HARGRAVES.

GENTLEMEN: I submit for your consideration the following method of preserving pathological specimens of a membranous kind, which I have used with success for the past three years, in which less alteration of the parts occurs than in any other method with which I am acquainted.

The specimen is well washed in cold water; it is then cut, so as to be stretched upon a pane of ordinary window glass. The side to be applied to the glass is to be lightly sprinkled with arsenic. The free surface is to be thickly powdered with arsenic, and the specimen is then to be kept in the shade, and, as the arsenic becomes absorbed, more is to be sprinkled on, until it becomes dry. After that, a coat of white varnish is put over the whole.

I present for inspection, specimens from two different subjects of the morbid lesions of typhoid fever. One set was prepared in July, 1855, now nearly three years since. The second was prepared about three months since.

Last summer I prepared thin slices of a cirrhosed liver in this manner, and had every reason to believe this method might be applied successfully to parenchymatous specimens, as well as to membranous ones. Unfortunately, they were taken away by some person unknown to me.

The specimens presented are those of the lesions of typhoid fever, and were prepared in the following manner:—

The intestine was cut on its omental edge, then washed; a little

arsenic was sprinkled on its peritoneal surface, and it was then stretched on the glass, the peritoneal surface being placed next the glass, and the mucous membrane being external. It was then treated as pointed out before.

R. D. ARNOLD, M. D.,
Of Savannah, Ga.

LETTER FROM E. D. FENNER, M.D.,

TO

PAUL F. EVE, M.D.,

PRESIDENT OF THE AMERICAN MEDICAL ASSOCIATION.

LETTER OF E. D. FENNER, M. D.

NEW ORLEANS, *April 27th*, 1858.

MY DEAR SIR:

ALLOW me to express to you my deep regret at finding myself unable to attend the meeting of the American Medical Association, at Washington City, on the 4th proximo. Having been a member of the primary Convention that met at New York, in May, 1846, and resulted in the organization of this national Association the year following, I have ever since felt a deep interest in its proceedings, and have cherished the hope that it would exert a beneficial influence on the medical profession throughout the Union. Nor have I failed to add a mite, occasionally, to the fund of knowledge annually published in its volumes of Transactions.

At our last meeting in Nashville, I gave an abstract of a contemplated report on epidemics, which was accepted and referred to the Committee on Publication. I found, subsequently, there was so little to say about the epidemics of 1856, that it would be better to wait until I could add the observations of another year. I merely wish to say now, that if it be agreeable to the Association, and my other duties should allow, I will send on a report for the years 1856 and '57. The behavior of yellow fever at New Orleans, during the last two years, while the city was under the protection of quarantine law, has been somewhat remarkable and worthy of permanent record, on account of its bearing on the future safety of the people in this section of the union.

If our governments (general, State and city) continue to neglect, as they have hitherto done, to thoroughly investigate the origin and propagation of this terrible pestilence, or to rely on no more efficient means of protection than quarantines and sanitary cordons, I think there is reason to apprehend, that like the plague of Egypt and the cholera of Asia, it may in a few years become so power-

fully virulent, that nothing short of *perfect non-intercourse* will be able to arrest its progress and prevent it from devastating the fairest portions of our beloved country.

The numerous experiments with quarantines for the last half century, enforced by governments far more rigid than our own, would appear to show that the benefits to be obtained from such measures are extremely limited, and that they cannot be safely relied on to avert the disastrous effects of pestilential diseases; while the accumulated observations of wise, patient, and philanthropic men during the same period, appear to prove most evidently that, wherever amelioration has been effected in the public health, it was mainly due to *local improvements in sanitary police.* It follows that such improvements are of vital importance to the public weal, and therefore demand the serious consideration of those who are intrusted with the reins of government. If it be right and proper to invest our rulers with power to maintain peace and good order in society, to administer justice, punish crime, and defend the country against foreign invasion; is it not equally right that they should likewise have the power to search out and remove the causes of disease, and, as far as possible, protect the people against the ravages of pestilence? I hope the Association will not overlook the opportunity presented by the meeting at Washington, to impress these solemn duties upon Congress and the Administration.

The subject of medical education will probably claim a large share of the attention of the Association at this meeting: Allow me to say, that if the committee appointed under the resolution of Dr. Curry, should report a *uniform system*, however high may be the standard, the New Orleans School of Medicine, with which I have the honor to be associated, will most probably adopt it.

And now, sir, hoping that harmony and good fellowship may prevail during the approaching meeting, and with assurance of the kindest regard for yourself, I subscribe myself very truly,

Your friend and obedient servant,

E. D. FENNER, M. D.

PAUL F. EVE, M. D.,
President of the American Medical Association,
Washington, D. C.

PRIZE ESSAY.

THE CLINICAL STUDY

OF THE

HEART SOUNDS IN HEALTH AND DISEASE.

BY

AUSTIN FLINT, M.D.,
BUFFALO, NEW YORK.

Clinica clinice demonstranda.

PRIZE ESSAY.

CLINICAL STUDY OF THE HEART SOUNDS IN HEALTH AND DISEASE.

THE term Heart-sounds is to be understood, agreeably to present usage, as embracing the normal sounds referable to the heart, and their abnormal modifications. The adventitious sounds pertaining exclusively to disease, are distinguished by the title of Murmurs. The clinical study of cardiac affections, which has been prosecuted of late years, with so much assiduity and success by observers in different countries, has had reference more especially to the murmurs. On the normal sounds and their abnormal modifications, comparatively small attention has been bestowed. In the course of investigations having reference to the diseases of the heart, I have been led to think that these sounds have not hitherto received that consideration which their importance claims. Impressed with the belief that a field for clinical research is here open, which requires only proper cultivation to yield results possessing not only interest, but much practical utility as regards our knowledge of the heart in its physiological and pathological relations, I have for some time been engaged in inquiries directed to the subject. My design in this essay is to contribute the fruits of my researches, and to indicate some of the questions which are only to be satisfactorily settled by an accumulation of facts developed by clinical observation. In treating of the subject, it will be most convenient and natural to consider, *first*, the study of the Heart-sounds in health, and *second*, the study of the Heart-sounds in disease.

THE HEART-SOUNDS IN HEALTH.

The intelligent medical reader is already familiar with the characters by which are distinguished, respectively, the two sounds of the heart. The descriptions by different authors do not materially differ. The first or systolic sound is described as louder, longer, duller, and lower in pitch than the second, and the second or diastolic sound, as shorter, sharper, and more flapping or valvular than the first. These characters are symbolized, after the ingenious plan first proposed by Bouillaud, by different syllables connected by a hyphen, which are supposed to be pronounced in a whisper—such as, tic-tac, lubb-dub, tiff-tac, lubb-tuk, too-to. The order of the succession of the sounds has also been studied with care, in order to determine the proportionate part of a beat or revolution of the heart belonging to each sound and to each of the two intervals which separate the sounds from each other, and the rhythm of the sounds and intervals is expressed in figures or in musical measure. These descriptions, however, are applicable to the heart-sounds only as heard in a particular situation within the præcordia, viz., at or near the part where the beating of the heart is usually felt, in other words, over, or in immediate proximity to the point of apex-impulse. Walshe, more than any other author with whom I am acquainted, dwells emphatically on the fact just stated. He has attempted, by connecting different syllables, to symbolize the different characters which the sounds of the heart present when auscultation is practised in different positions in the præcordia, but he has not pushed inquiries in this direction so as to reach important conclusions to be deduced from these variations.

The results of accurate examinations of the healthy chest, form, of course, the true and only basis of the clinical study of the normal heart-sounds. Scientific accuracy requires, in addition to a competency for such examinations derived from a practical knowledge of physical exploration, sufficient carefulness of observation, and also that the facts observed be recorded and preserved in a form to admit of analysis. In pursuance of this plan for accumulating data for the investigation, I selected twenty-five persons presumed to be entirely free from cardiac disease. As evidence of the latter indispensable qualification, all the physical signs of disease of the heart were wanting, and, as an additional security, none had ever experienced an attack of acute rheumatism, or suffered from

any grave affection of the chest. All were males in perfect health, and, with a few exceptions, were between the ages of twenty and thirty. The examinations were leisurely made. In no instance was an examination of more than one person made at a time, and repeatedly the examination occupied two sittings. In fact, the twenty-five examinations were made at different times extending over a period of a year. The facts observed were invariably recorded at the moment of the examination. In all the examinations save three, I was assisted by a medical friend equally interested in the investigation and an expert in physical exploration, by whom the accuracy of the observations were confirmed before being recorded. In the three excepted instances, the persons examined were medical friends of the writer. I should add, that, in making these examinations, the stethoscope invented by Dr. Cammann, of New York, was employed. From the remarkable power of conduction which this instrument possesses, and other advantages, it is admirably adapted to such investigations, when the ear has become accustomed to its use. I may mention here, that, when not otherwise specified, it is to be understood that the person examined was in the sitting posture.

Proceeding to treat of the normal heart-sounds, my statements, as regards clinical facts pertaining thereto, will be based mainly on the results of the analysis of the observations obtained in the manner just described. With respect, however, to certain points concerning the sounds of the heart in health, clinical facts obtained by examinations in cases of disease, have bearings which are legitimate and important. I shall be at liberty, therefore, to refer to these.

It will conduce to clearness, to consider the first and second sounds under distinct heads; and I commence with the second, because this sound is more simple than the first, and, as regards its mechanism, better understood.

I. Second or Diastolic Sound.—It may be assumed as sufficiently established, that the normal second, or diastolic sound, is produced mainly at the ventriculo-arterial orifices of the heart, and that the semilunar valves of the aorta and pulmonary artery are essential to its production. To enter into the experimental observations warranting this assumption, would be foreign to my present object, which is limited to the clinical study of the heart-sounds. With respect to the point stated, there is now great una-

nimity of opinion, although as regards the physical principles involved in the mechanism, there is still scope for discussion.

The questions which suggest themselves, to be settled, if possible, by clinical researches, are the following: Is the second sound an unmixed sound, emanating from the ventriculo-arterial orifices? Are the sounds produced at the pulmonary and arterial orifices identical, or so combined as not to admit of discrimination; or have each of these sounds certain distinctive features, by means of which it may be distinguished from the other? If the sound produced at the aortic, and that produced at the pulmonary orifice, are distinguishable from each other, at what points in the præcordia, and over the chest, are they respectively discoverable in health?

With reference to these questions, the second sound is to be studied and compared in different situations. These situations are to be selected with regard to the anatomical relations to the chest, of the heart, and the large vessels with which it is connected. The intensity of the second sound, as is well known, exceeds that of the first, generally, in health, at the base of the organ. In the regular succession of the two sounds with each successive beat or revolution, the stress appears to fall upon the second in this situation. The second sound is said to be *accentuated*, a term which expresses well the fact just stated, regarding the two sounds as represented by two syllables, or by two successive notes in a musical measure. Following Hope, writers are accustomed to indicate the second intercostal space (the space between the second and third ribs), close to the sternum, as the point at which the characters of the second sound may be best studied. Although somewhat above the level of the semilunar valves, it is easy to understand, viewing the situation of the pulmonary artery, and the aorta, that the sounds produced at the orifices of these vessels should be most purely and perfectly transmitted to the ear at that point. Writers of a date still more recent than Hope, have indicated the second intercostal space on the *left* side, as the situation in which the sound emanating from the pulmonary orifice may be studied; while in the same space on the *right* side, the sound is derived from the aortic orifice. This is not *à priori* improbable when the relative positions of the aorta and pulmonary artery to the two sides at this point are considered. At the left second intercostal space near the sternum, the pulmonary artery is in close proximity to the thoracic wall, and the stethoscope placed here is not only so disposed as to conduct the sound propagated from that

vessel, but the sound from the aorta must pass through the pulmonary artery to be transmitted to the ear of the auscultator. The same is true of the aortic sound when the instrument is applied at the corresponding point on the right side. But whether the sound heard on the left side be pulmonary, and that on the right side be aortic, is to be determined after instituting a comparison as regards the characters of the second sound in these two situations, in a series of observations on different persons.

The base of the heart will also include the third intercostal space on the right and left side. These will constitute other points for studying the second sound. And in the same category may be embraced, as other points relating to the base, the first intercostal space on the right and left side, near the sternum.

Other situations in which this sound is to be studied, are in relation to the body, apex, and sides of the heart. The following will embrace a sufficient number of distinct points for examination. The irregular triangular space in which the heart is uncovered of lung, and in immediate contact with the thoracic walls, exclusive of that portion occupied by the pointed extremity, or apex of the organ. This space is called the superficial cardiac region, and may be indicated on the præcordia with sufficient accuracy for practical purposes, by connecting, by a line slightly curved downward and outward, a point on the median line, on a level with the cartilage of the fourth rib, with the point at which the apex beat is felt, usually in the fifth interspace, about an inch within a vertical line passing through the nipple; next, by a line slightly curved downward, the point at which the apex beat is felt, with a point on the median line, on a level with the cartilage of the sixth rib, and, lastly, uniting the two points already indicated, on the median line. Beneath the superficial cardiac region, as thus delineated, exclusive of the portion in which the apex beat is felt, lies a considerable part of the *right* ventricle.

The space over which the apex beat extends, is a situation for observation, exclusive of the remainder of the superficial cardiac region, since here the pointed extremity of the *left* ventricle, by its systolic movements, presses with impulsive force against the thoracic walls.

Another situation is at the median line over or just above the xiphoid cartilage. This corresponds with the inferior border of the *right* ventricle.

Another is over, or just within the nipple, corresponding to the

left border of the heart, formed by the *left* ventricle; and another is at the right margin of the sternum, on a level with the fourth intercostal space, which corresponds to the right border of the heart formed by the *right* ventricle.[1]

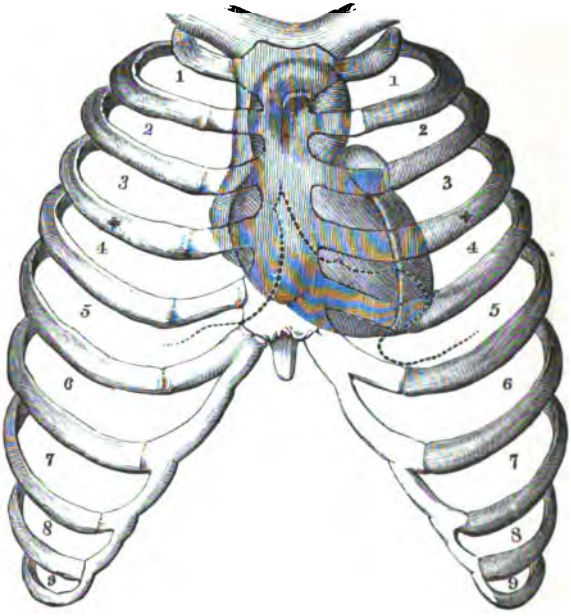
The foregoing situations relate to the præcordia. But it may be useful to study the heart-sounds at certain points removed from the space which the heart occupies. In making my observations, I have noted the characters of the sounds on the lateral surfaces of the chest; at the summit, in the centre of the infra-clavicular region; on the neck, over the carotids, and on the back.

We will now proceed to consider the normal second, or diastolic sound, as studied, *first*, at the base of the heart; *second*, over the body, the apex, and the borders, lower, and lateral, of the organ, and, *third*, at different points removed from the præcordial region.

The Second, or Diastolic Sound, at the Base of the Heart.—In the second intercostal space on the *left* side, near the sternum, the relative intensity of the second sound, or its accentuation, is more or less strongly marked, as a rule. A single exception only to this rule was observed in my twenty-five examinations. This rule obtains, while the action of the heart is tranquil. When, from exercise or mental agitation, the heart's action is increased, the relative intensity of the first sound may predominate here, as well as on the right side, the same as when the heart's action is morbidly increased. The intensity, however, varies considerably in different persons. In a single instance, the sound was not distinctly appreciable, until after slight exercise. The pitch of this sound is invariably higher than that of the first sound. It is usually somewhat shorter. It possesses a certain quality which may be characterized as *valvular*, inasmuch as we have assumed that the sound is referable to the semilunar valves, and, moreover, it may be imitated by the sudden, forcible tension of pieces of membrane immersed in a liquid. It seems to emanate from a point nearer the ear than the first sound.

In this brief description I have enumerated characters relating to intensity, duration, quality, pitch, and apparent distance of sound. Under these several aspects, the heart's sounds are to be studied and compared.

[1] The reader is referred to the accompanying diagram, in order that the relations of different portions of the heart to the several situations in the præcordia, mentioned above, may be presented to the mind more clearly.



Nos. 1, 2, 3, 4, etc , on both sides, indicate the intercostal spaces.

+ On the fourth rib, indicates the situation of the nipple.

The dotted curved lines on the surface of the heart, indicate the borders of the right and left lungs; the space embraced within these lines, is the superficial cardiac region.

In the second intercostal space on the *right* side near the sternum, the relative intensity, or accentuation, is generally greater than on the left side. This is in part owing to the fact that the intensity of the first sound is usually less on this side; but, as a rule, the second sound is absolutely louder on the right side. In but two of twenty-five examinations was the intensity not greater than on the left side. The intensity, however, varies considerably in different persons. The pitch of the sound, in the majority of instances, is distinctly higher than in the corresponding intercostal space on the left side. Four exceptions to this rule, in the twenty-five examinations, were noted. In these excepted cases there was no perceptible difference in pitch between the two sides. The quality of sound is valvular in a more marked degree. The sound occurs more quickly, and seems to be somewhat shorter, rendering it more sharply defined and abrupt. It appears to originate nearer the ear; in this respect, it differs very uniformly and strikingly from the sound on the left side.

Thus, it appears that the second sound in the second intercostal space on the right side, in most healthy persons, differs from that in the corresponding situation on the left side, in all the different aspects under which the heart-sounds are to be studied, viz., as regards intensity, duration, quality, pitch, and distance. It is hardly to be supposed that this disparity is due to different modifications which the sound receives in its passage to the ear, in these two situations; and hence, it is a logical conclusion that the characters of the sound in each situation indicate a distinct source.

Taking this inference, in connection with the anatomical relations of the aorta and pulmonary artery to the chest, in the situations in which we have thus far studied and compared the second sound, it may be fairly concluded that the characters which distinguish this sound on the right side, are referable to the aortic valves, and those which distinguish the sound on the left side are referable to the valves of the pulmonary artery. We may, therefore, designate the sound on the left side as the pulmonary, and that on the right side as the aortic second sound of the heart.

The characters belonging to each of these two sounds are generally so distinctive, that a practical auscultator, after having made the comparison, is able instantly to recognize each when heard, during the course of the examination, in other situations in the præcordia, or over the chest. The verification, however, of the identity of the aortic or the pulmonary sound, elsewhere than at

the situations in which they have now been contrasted, does not, of course, rest on the fact just stated, for the comparison can be made by constant reference to the sound as heard at the second intercostal space.[1]

In the *third* intercostal space on the left *side*, near the sternum, the second sound is generally accentuated. It was not so in only two of the twenty-five examinations. It is almost always more intense than in the *second* intercostal space, on the same side. It is generally higher in pitch, more valvular, and, in fact, is identical with the sound heard in the second intercostal space, on the *right* side—that is, the aortic second sound—except that it does not seem to be so near the ear. This is the rule. Of the twenty-five examinations, in two the sound corresponded in its characters with that in the second intercostal space on the left side—that is, with the pulmonary second sound. But in one of these exceptional instances, the sound in the second intercostal space on both sides was identical.

In the *third* intercostal space, near the sternum, on the right side, the second sound always has the characters of that in the second intercostal space on the same side, except as regards intensity and proximity to the ear. In the majority of instances, it is less intense than in the second intercostal space on the right side, but not unfrequently the intensity in the two situations is about equal. It is also, as a rule, less intense than in the *third* intercostal space on the *left* side.

The characters of the sound in the *first* intercostal space, on the *right* and *left* sides, were studied in only a small number of instances. In these instances, on the *left* side it corresponded with the aortic sound, and with the pulmonary sound, respectively, in an equal proportion. On the *right* side it corresponded uniformly

[1] That the second sound produced at the pulmonary orifice may be heard at the base on the left side, and not elsewhere, being limited to that situation, while the aortic sound is wanting on the right side at the base, and elsewhere, when disease exists which has destroyed the action of the valves of the aorta, will be seen in a case coming under my observation, which will be given in the latter part of this essay. Such a case furnishes corroborative proof of the conclusion drawn from the disparity between the right and left side, in the second intercostal space, as regards the different origin of the second sound at these points. Farther proof of this conclusion is also afforded by the fact that an aortic systolic murmur has its maximum of intensity at the base on the right side, and may even be limited to this situation; and, on the other hand, a murmur produced at the pulmonary orifice, manifest itself in the corresponding situation on the left side.

with the aortic sound. It was invariably more intense on the right than on the left side.

As regards, then, the foregoing situations pertaining to the base of the heart, the characters which distinguish the sound referable to the aortic orifice, predominate always in the *first*, *second*, and *third* intercostal spaces near the sternum on the right side, and, as a rule, in the *third* intercostal space, on the left side; while the characters distinguishing the sound referable to the pulmonary orifice, predominate, as a rule, in the *second* intercostal space near the sternum on the left side, and in the *first* intercostal space on the same side, in about one-half of a given number of cases.

The Second, or Diastolic Sound, over the Body, the Apex, and the Borders, lower and lateral, of the Heart.—Below the fourth rib on the left side, over the body of the heart, and within the area of the superficial cardiac region, the second sound ceases to be accentuated; the first sound acquires a greater relative intensity. This rule held good in all but two instances. In one of these, the second sound preserved the accent, and in the other, neither sound was accentuated. In most instances, the sound presented the characters, as regards pitch and quality, which distinguished the aortic sound. In a few instances, the characters were those of the pulmonary sound. The intensity differed considerably in the different cases.

Over the point of apex beat, the greater relative intensity of the first sound is strongly marked. In one instance, however, an exception to this rule was found, the second sound being distinctly accentuated at the apex. In this case, there was absence of any perceptible impulse. In every instance, the characters of the second sound, as regards pitch and quality, were those which distinguished that referable to the aorta. The absolute intensity of the sound at the apex, although it seemed more distant, was frequently as great as at the second intercostal space on the right side, and sometimes it was even greater. This is likely to be overlooked, unless attention be directed to it, in consequence of the much greater relative intensity of the first sound in this situation.

At the left border of the heart, over the nipple, the second sound is accentuated in the majority of instances. This is the rule, with frequent exceptions. The characters of the sound, as regards pitch and quality, are those which distinguish that produced at the aortic orifice.

Over the inferior border of the heart, just above the xiphoid cartilage, the accent falls, in about an equal proportion of instances, on the first and second sounds, respectively. Compared with the sound over the apex, it is feeble and distant in this situation. In some instances, the characters, as regards pitch and quality, were those which belong to the pulmonary sound; but often the sound was of aortic origin.

On the right border of the heart, at the right side of the sternum, below the fourth rib, the sound is almost always heard, although sometimes feeble and distant. It is often accentuated, and presents the characters of the aortic sound.

In the several situations, then, embraced under this head, the characters of the aortic second sound predominate invariably at the apex, and the left border of the heart. This also obtains, as a rule, over the body of the organ, and over its right and inferior borders. The second sound loses its accentuation almost invariably over the body and apex, while it is oftener accentuated over the left, the inferior and right borders of the heart.

The Second, or Diastolic Sound, at different points removed from the Præcordial Region.—The points removed from the præcordial region, at which the sounds were studied, are as follows: The lateral surfaces of the chest, *i. e.*, the axillary and infra-axillary regions; the centre of the infra-clavicular region on both sides; on the neck over the carotids, and on the back.

The second sound is usually heard over both lateral surfaces. It is rarely wanting in the left lateral surface, but oftener on the right side. When the two sounds are heard, in either situation, the second is accentuated. In several instances, the second sound was alone heard on the left side, and the instances were more numerous in which the first sound was wanting on the right side. The sound corresponded in pitch with that referable to the aortic orifice. In the infra-clavicular region, the sound was uniformly heard on the right side, but it was sometimes wanting on the left side. When present on both sides, it was invariably more intense on the right side than on the left. The pitch of the sound, in some instances, seemed to be higher on the right side.

The characters were always aortic on the right side, but in the instances just referred to, on the left side, they appeared to indicate that the source of the sound was in the pulmonary artery.

On the neck, over the carotids, the second sound was almost

always accentuated, and generally accompanied by a metallic, or ringing intonation. The latter obscures somewhat the valvular quality of the sound.

On the back, the sound was sometimes heard on both sides, and sometimes on the left side only, the point most favorable for its detection being at or near the lower angle of the scapula. Immediate auscultation was found to be better adapted to this situation than Cammann's stethoscope. On the right side, the second sound, when heard, was usually unaccompanied by the first. This was the case frequently on the left side, and when the two sounds were heard, the second was accentuated.

Of the foregoing situations, then, we find in all a greater relative intensity of the second sound; and frequently the second sound present without the first. This shows that, judging from the extent of its diffusion, the second sound possesses greater absolute intensity than the first sound. The first sound, as a rule, is soonest lost in removing the stethoscope or ear from the præcordial region, in any direction. It becomes accentuated, that is, its relative intensity becomes greater, as a rule, directly after the stethoscope is carried beyond the borders of the heart.

A point of observation incidental to the study of the second sound, in all the situations in which its characters have been considered, is the unchangeableness of this sound, in other respects than intensity and distance. Exclusive of the situations in which the characters of the pulmonary sound predominated; in other words as a rule, in all situations—except the second intercostal space on the left side—the second sound retained those intrinsic features pertaining to quality, pitch, and duration, referred to the aortic orifice. Variations in the position of the person examined, did not affect these features, nor produce any notable change in intensity. We shall see that, as regards unchangeableness, the second sound differs in a striking manner from the first. This unchangeableness goes to show that the second sound is an unmixed sound; that it consists, as it were, of a single element, and that the mechanism of its production is more simple than that which gives rise to the characters by which the first sound is distinguished.

II. The First or Systolic Sound.—As regards the part or parts of the heart which are chiefly concerned in the production of the first, or systolic sound, there is not that agreement among writers which exists with reference to the second, or diastolic

sound. There is, in fact, considerable difference of opinion on this subject. A great number of theories have been proposed to explain the manner in which this sound is produced. It is foreign to my present object to discuss these theories; and even to enumerate and describe them, would require more space than can be afforded consistently with the limits of this essay. I shall therefore confine myself to the results of an analysis of my examinations, and to the conclusions which may be drawn from them.

In theorizing on this subject, writers have generally based their views on the facts disclosed by experimental researches on living animals, with a portion of the chest removed so as to expose the heart to the view and touch. The experiments made on large animals under the direction of Dr. Hope, in 1830 and 1831; by a committee of the Dublin Society, in 1835; by Drs. Pennock and Moore, in this country, in 1839, and by the London committees of the British Association, in 1839–40, contributed important facts pertaining to the movements of the heart. These experiments, also, go to show and establish the dependence of the second sound on the action of the aortic and pulmonary valves. But with respect to the agencies concerned in giving rise to the first sound, they do not warrant positive conclusions. In fact, the opinions formed by the different experimentalists differ. A little reflection must suffice to show that it is impossible by means of vivisections to study satisfactorily the sounds of the heart. Auscultation must be practised, in these experiments, with the ear or stethoscope applied directly upon a muscular organ almost constantly in active motion. How is it possible to determine, under such circumstances, the true characters of the heart-sounds?[1] Moreover, the exposure of the heart involves the absence of the impulsion against the thoracic walls which takes place when the relations of the heart to the chest are not disturbed; and we have certainly no right to take it for granted that this impulsion is unimportant as regards the production of the sounds of the heart. The situation of the aortic and pulmonary valves is such, that in experiments on living animals of large size, they may be hooked up or destroyed, and the heart's action continue. This kind of experimentation is not applicable to the auricular valves. Hence, the agency of the latter must be determined inferentially.

[1] This will of course, apply equally to the cases of *ectopia cordis* which have been observed.

From what has been stated, it follows that the investigation of the first sound with reference to its production, is to be pursued mainly by means of the clinical study of the heart-sounds in health and disease.

Proceeding now to the study of the first sound in health, the following inquiries may be proposed: Is the first sound unmixed or compound; and if compound, of what elements is it composed? What are the characters which this sound presents, derived from intensity, duration, pitch, quality, and proximity to the ear, in the various situations in which the characters of the second sound have already been studied?

I will anticipate the conclusions to be drawn from the examinations of the healthy chest, by stating that the data thus obtained appear to me to be adequate to prove that the first sound is composed of two distinct elements; and more than this, they suffice to establish the nature and source of the two elements which compose this sound. These two elements are, *first*, a valvular sound, shown by clinical facts pertaining to disease and health, to be due to the action of the auricular valves; and, *second*, a sound due to the impulsion of the apex of the heart against the thoracic walls. The *first* element may be distinguished as the *valvular element* of the first sound, and the second may be called the element of impulsion.[1] What are the facts which justify the statements just made?

[1] The discussion of the mechanism of the production of sounds is waived as foreign to my present purpose. The clinical facts presented, in the mind of the writer, seem to be sufficient to establish the division into two elements, and that one of these elements is due to the impulsion of the apex of the heart against the thoracic walls. This element is admitted by some writers on the subject, for instance by Prof. Skoda, but in general it is not recognized. The explanation of the first sound which appears to have met with most favor, irrespective of any reference to the tension of the auricular valves, is that which attributes it directly to muscular contraction. This is the explanation adopted by Drs. Pennock and Moore, Dr. Williams, the London and Dublin committees, and others. The basis of this theory is the fact that a first sound is heard with greater intensity when the heart is exposed and the stethoscope placed directly over the organ, than when auscultation is practised on the chest. That an intense sound, under these circumstances, is produced, is undoubtedly true, but that this sound is to be received as representing the sound produced when the heart is *in situ* and covered by the thoracic walls, may fairly be doubted. But whether the element which I have styled the Element of impulsion be due to the impulsion of the heart or to a sound emanating from the muscular wall of the heart, the clinical relations are the same: practically, it is not very important which of these explanations be adopted. That an element of the first sound is produced by the play of the

The characters by which the first sound of the heart is distinguished from the second sound, have already been enumerated. It has been stated, also, that these characters, as generally described, are applicable to the first sound only as heard at or near the point at which the apex beat is felt. The intensity of the first sound is greatest at this point. It is here strongly accentuated, almost invariably, although the second sound in this situation is often scarcely less intense than at the base of the heart on the right side. Analyzed with regard to its intrinsic features, the first sound at this point has a quality of impulsion which is generally the predominant feature. But in some instances a valvular quality is also more or less appreciable, and occasionally it is the predominant feature. The sound is prolonged, being nearly twice as long as the second; loud, dull, booming, having its maximum, as regards these distinctive features, at this point. If, now, having verified these characters in an examination on the healthy chest, a folded handkerchief be placed between the stethoscope and the integuments, the sound is divested of some of its most distinctive features. It loses the quality of impulsion, and presents a well marked valvular quality. It is less prolonged, less accentuated, and its booming character is wanting. It approximates, in fact, as regards quality and duration, to the second sound, but is invariably lower in pitch. A similar effect is produced when the pectoral extremity of Cammann's stethoscope is very lightly and imperfectly applied to the chest. The same change also occurs when the position of the person examined is varied. In the description of the first sound which I have given, it is to be understood that the examination is made in the sitting posture. Let the person lie on the left side, and the characters of impulsion, prolongation, and intensity, over the apex, are still more marked than when he is sitting. In that position, *i. e.*, lying on the left side, more than in any other, the impulse or apex beat is strongly felt by the hand. If the patient lie on the back, the characters just mentioned, distinctive of the first sound, are less marked, the impulse on palpation being lessened in the same proportion. Lying on the right side, in which position the apex impulse is often not felt, the characters pertaining to the element of impulsion are pro-

auricular valves, is generally admitted. As the reader will perceive in the second part of this essay, the abnormal modifications of the first sound involve more especially this fact.

portionately diminished or lost. These facts show that certain characters belonging to the first sound are impaired or extinguished by diminishing the force of the impulsive movement of the apex against the chest, or by interposing an obstacle to their free transmission to the ear.

The existence of two distinct elements in the first sound, one due to the heart's impulse, and the other to valvular action, is shown as conclusively by another mode of investigation, viz., comparing the sound at the point of apex beat, with the sound at a distance from the heart. After studying the characters of the sound over the apex, let the auscultator carry the stethoscope to the left of the heart, until the second sound becomes distinctly accentuated. This point may be just without the nipple, or farther to the left. The element of impulsion, entering into the composition of the first sound, is eliminated. The valvular element remains isolated. The first sound has the valvular quality not less marked than the second. In duration, it does not exceed the second. Its intensity is less, and its pitch is lower; in these latter characters, only, consists the disparity between it and the second sound.

The correctness of this analysis of the first sound is confirmed, if it be shown that morbid conditions, in which the apex of the heart is removed from the thoracic walls (as in cases of emphysema, pericarditis, and pleurisy, affecting the left side, accompanied by liquid effusion); cause an elimination of the element of impulsion, leaving the valvular element disassociated from the former. Clinical observation will show this to be true. Confirmation is also derived from the effect of diseases which weaken, in a marked degree, the muscular power of the heart. For example, in cases of the typhus, and typhoid fevers, characterized by adynamia, it is now well known that the first sound suffers considerable diminution of its intensity. This diminution affects more especially the element of impulsion, leaving the valvular element less affected, and consequently predominant. The sound, under these circumstances, is not only enfeebled, but it becomes shorter, and approximates closely in quality to the second sound. Instances are occasionally met with, in which, irrespective of disease affecting the heart, or the other thoracic viscera, the first sound lacks the element of impulsion.[1]

[1] This fact was noticed by Bouillaud, prior to the publication of his treatise in 1841. He says in that treatise, "J'ai observé chez un certain nombre d'individus

A striking instance of this kind lately came under my observation, in the case of a hospital patient affected with Bright's disease, but in whom there was no evidence of dropsical effusion into the serous cavities, or of any chest affection. The patient was able to be up and out of doors, and was employed to do light duty in the institution. In this case, no impulse on palpation was perceptible anywhere. The heart-sounds were so faint, as not to be readily discovered in the præcordia. They were, however, heard over the apex, and the first sound was as short and purely valvular in quality as the second sound. Examinations were repeatedly made by myself, and by others practised in physical exploration, with reference to this interesting peculiarity.[1] Another illustration is afforded in auscultating the fœtal heart in pregnancy. The first sound, under these circumstances, is as purely valvular as the second, and is distinguished from the latter only by the greater duration of the silence which precedes it.

When the two elements of the first sound are united, as is usually the case over the apex, the valvular element occurs at the commencement of the sound, and ceases before the sound ends. The prolongation of the sound is thus due to the element of impulsion. The valvular quality of this sound, when both elements are combined, is first perceived, if at all, and is lost, as it were, in the quality of impulsion. The fact, however, just stated, is proved in the following manner: Selecting a person in whom the quality of impulsion over the apex is well marked, let the interval between the first and second sounds (the post-systolic silence) be observed in that situation, and directly afterward, at a distance from the heart sufficient for the elimination of the element of impulsion. The interval between the sounds will be found to be distinctly longer in the latter situation than over the apex. This interval is short, in proportion as the element of impulsion is marked, and it is found to be lengthened in any situation in which the valvular element is detached from its fellow. Generally, over the apex the element of impulsion appears, from the first, to be in combination

que les deux bruits du cœur étaient à peuprès complément semblables sous le double rapport, de la durée et de l'éclat; et dans ce cas, c'est le premier bruit qui est devenu plus clair, et non le second qui a perdu éclat." Tome premier, page 118. Bouillaud, however, does not draw from this fact any deduction. He mentions it simply as a matter of clinical observation.

[1] Case of Olds, Hospital Records, vol. xiii. page 82.

with the valvular element, so that the latter is, as it were, drowned by the former.

It now remains to study the characters of the first sound in the various situations in which the second sound was studied. Since the first sound has been shown to be compounded of two elements, in this respect differing from the second sound, which consists of a single element, it will be a point of interest and importance to inquire concerning the predominance of either element over the other, or the presence of one without the other, in the several situations in which the characters of the sound are to be studied. Another point of inquiry relates to the different sources of the valvular element of the first sound. Assuming this element to be due to the action of the auricular valves, those on both sides of the heart, viz., the mitral and tricuspid, it is to be presumed, both take part in its production. Now, is it practicable to discriminate between the sounds emanating from these valves respectively; in other words, does the first sound possess characters, in certain situations referable to the mitral, and in other situations to the tricuspid valves?

In studying the second sound, we commenced at the situations corresponding to the base of the heart, this sound presenting at these situations its characters best marked; for the same reason, the apex of the heart is to be selected as the point of departure for the study of the first sound, the characters which distinguish the latter being generally here most strongly pronounced.

The first, or Systolic Sound, over the Apex, the Body and the Borders, lower and lateral, of the Heart.—The distinctive characters which belong to the first sound over the apex, have already been sufficiently described. It is here that the sound has its maximum of intensity in the vast majority of instances. Hence, M. Pigeaux proposed to distinguish this as the *inferior* sound, and to designate the second as the *superior* sound. Its intensity, however, varies considerably in different persons. There is no ideal standard of intensity which pertains to health. Anything which excites the action of the heart within the limits of health, such as exercise, or mental agitation, increases the force of the first sound, the second sound not being proportionately, if at all, affected. The sound is, of course, strongly accentuated in proportion to its greater relative intensity, and it is frequently attended by tinnitus, or ringing intonation. A fremitus is also sometimes appreciable. The element of

impulsion generally, as already stated, predominates at the apex, frequently drowning the valvular element. But, in some instances, the latter element is more or less appreciable, and it may even be apparent in a marked degree. In one instance among my examinations, the valvular element predominated at the apex. The first sound resembled the second in quality and duration, and the second sound was accentuated. In this instance, there was no impulse perceptible to the touch in any situation.

Over the body of the heart, within the superficial cardiac region, the first sound is almost invariably accentuated. There were but two exceptions to this rule in my examinations. As an exception to the rule, the maximum of intensity of the first sound is occasionally found to be in this situation, *i. e.*, over the body of the organ above the apex. The element of impulsion predominates in the greater number of instances; but in five of the twenty-five examinations, the valvular element predominated, and in some instances the first sound was as valvular, and not longer in duration than the second. In a few of the instances in which the quality of impulsion was marked, tinnitus existed.

At the left border of the heart just without or over the nipple, the first sound is accentuated in a small minority of instances. The valvular element predominates here as a rule to which there are but few exceptions. In the greater number of instances the valvular element is here disconnected from the element of impulsion. If this elimination of the latter element does not occur at or just without the nipple, it is effected by carrying the stethoscope to a distance more or less removed from the nipple. It is a repetition of what has been already stated, to say that, in proportion as the element of impulsion is eliminated, leaving the valvular element isolated, the sound becomes not only valvular in quality, but shortened, in these respects similar to the second sound, but always, in every situation, lower in pitch than the second sound. The greater relative intensity of the second sound at the left border of the heart, and the fact that in carrying the stethoscope beyond this point to the left, the first sound is often lost while the second is still heard, show that the absolute intensity of the valvular element of the first sound is less than that of the second sound. The fact that the element of impulsion is frequently lost at the border and always at a short distance from this, while the valvular element continues to be heard, shows that the latter is farther propagated than the former. Whether this is owing to a greater absolute in-

tensity of the valvular element is questionable. It is perhaps rather due to the difference as regards source between the two elements: agreeably to conclusions which have been deduced from facts already presented, the valvular element, as the name denotes, originates in the action of the auricular valves, while the element of impulsion depends on the impulsive movements of the apex of the heart. The latter is thus *exocardial* and the former *endocardial* in its origin, adopting terms applied by Dr. Latham to distinguish the *murmurs* arising within and without the heart. It is worthy of remark that the fact just stated harmonizes with what is true with respect to endocardial or bellows murmurs and exocardial or friction murmurs, viz., the latter are rarely heard beyond the border of the heart, and this is one of the points by which they are distinguished, while the former not only are heard at a distance more or less removed from the heart, but are frequently more marked without than within the limits of the organ. In view of the relation of the left border of the heart to the left ventricle and the left auriculo-ventricular orifice, it is fair to presume that the valvular element of the first sound in this situation is mainly due to the action of the mitral valve.

At the inferior border of the heart, just above the xiphoid cartilage, the first sound was accentuated in about one-half the persons examined. In some instances the sound was scarcely heard in this situation, and in other instances it was tolerably intense. The valvular element generally either predominated or was alone appreciable. As regards the pitch of the sound, on comparing it with the sound over the apex and left border at the nipple, in the greater number of instances a disparity was not evident, but in several instances it was sufficiently apparent. In these instances the disparity was not the same when the comparison was made with the sound over the apex, as with that over the left nipple. Compared with the sound over the apex, the pitch was higher in the instances in which a disparity was observed, while as compared with the sound at the nipple, the sound at the inferior border was uniformly lower in pitch. The inference which it is probably admissible to draw from these results is, that in the instances in which a disparity in pitch is appreciable, the character of the valvular element of the sound at the lower border of the heart is determined by the action of the tricuspid valves. These results, moreover, show that the valvular sound emanating from the tricuspid valves is higher in pitch than the sound compounded of the

valvular element and the element of impulsion as heard over the apex; but that the valvular sound emanating from the tricuspid valves is lower in pitch than that emanating from the mitral valves, when the latter is disconnected from the element of impulsion.

At the right border of the heart, the sound is generally appreciable, but sometimes feeble and distant. The valvular element predominates. The pitch is sometimes lower than at the left border, and in other instances no disparity was observable.

First, or Systolic Sound, at the Base of the Heart.—This sound is very rarely accentuated at the base of the heart, either in the second or third intercostal spaces, on the right or left side of the sternum. In the second intercostal space on the left side, the sound is often distant, obscure, and undefined. In some instances, it is valvular and short, resembling, in these respects, the second sound. In the second intercostal space on the right side, as a rule, it is more feeble than on the left side. In the third intercostal space on the left side, the sound is louder than in the second intercostal space on the same side, with frequently the element of impulsion more or less marked. In the third intercostal space on the right side, the intensity is less than on the left side, and the valvular element oftener predominant.

The first, or Systolic Sound, at different points removed from the Præcordial Region.—At the lateral surfaces of the chest, the first sound in some instances is not appreciable on either side. This is the case sometimes, when the second sound is distinctly heard. The first sound is oftener lost on the right than on the left side. The instances are indeed numerous in which it is not heard on the right, while it is discovered on the left side. When heard on both sides, it is uniformly louder on the left side. It is not heard on either side without the second sound, and the latter is almost invariably accentuated. On either side, the valvular element predominates, or is entirely disassociated from the element of impulsion.

In the infra-clavicular region, the sound is frequently heard on both sides. It is almost invariably louder on the left than on the right side. It is often wanting on the right, when present on the left side. The valvular element is here either predominant, or exclusively present.

On the back, the sound is sometimes heard on the left side, but very rarely on the right side. It is not heard without the second

sound, the latter being accentuated; but the second sound is often present, when the first is wanting. The valvular element exists alone, whenever the sound is appreciable.

On the neck, over the carotids, the first sound in relative intensity was less than the second. The valvular quality is not marked in this situation.

This concludes the consideration of the *heart-sounds in health.* The more interesting and important of the conclusions to which we have been led by clinical observation, are embraced in the summary which follows.

SUMMARY OF CONCLUSIONS BASED ON THE STUDY OF THE HEART-SOUNDS IN HEALTH.—1. The *first* sound of the heart is a mixed sound, when studied at the situation where its intensity is greatest, viz., over the apex of the organ. Comparing its characters in this situation, when the person examined is placed in different situations; when the stethoscope is placed directly on the surface, and when a soft material is placed beneath the instrument, or when it is very lightly and imperfectly applied; contrasting its characters over the apex with those in situations more or less removed from the borders of the heart, and taking into consideration modifications incident to certain diseases, and peculiar to certain persons in health, this sound is shown to be composed of two elements, one due to valvular action, and the other to the impulsion of the apex against the thoracic parietes. The first of these elements may be called the *valvular element*, and the second, the *element of impulsion.*

2. The *first* sound is almost invariably, but not invariably, accentuated at the apex. The element of impulsion is here almost constantly predominant. The element of impulsion also predominates, as a rule, over the body of the heart; but, occasionally the valvular element becomes more or less marked, when the stethoscope is carried above the apex. At the base of the heart, the valvular element is much oftener predominant than over the body of the organ. At the left border, over the nipple on the left side, the valvular element generally predominates, and on carrying the stethoscope to the left of this point, for a greater or less distance, the element of impulsion is eliminated, and the valvular element remains, leaving the sound as purely valvular in quality, and as short as the second sound. The valvular element predominates generally at the right border of the heart, and at all the points re-

moved from the præcordial region, where the first sound is appreciable. Although, therefore, the element of impulsion is usually predominant over the apex and body of the heart, the valvular element is alone diffused much beyond the limits of the organ.

3. The valvular element of the first sound is less intense than the second sound, the latter being often heard in situations to which the former is not transmitted, viz., on the lateral surfaces of the chest, in the infra-clavicular region on the right side, and over the back.[1]

4. Over the inferior border of the heart near the xiphoid cartilage, the valvular element of the *first* sound frequently differs in pitch from the same element of this sound when studied at, or without, the left nipple. This may be considered as showing that in the latter situation, the sound emanates from the mitral, and in the former situation from the tricuspid valves. When a disparity in pitch is presented by the first sound in the situation just named, the pitch is lower at the inferior border of the heart. When the sound in this situation is compared with that over the apex, and a difference is observed in pitch, the pitch is lower over the apex.

5. The intensity of the *first* sound not only varies widely in different persons, but is subject to considerable variations in the same person within the limits of health, as well as in connection with disease. These variations in intensity affect especially the element of impulsion. The valvular element undergoes comparatively little change, in this respect resembling the *second* sound of the heart.

6. The interval between the first and second sounds varies in different persons, according as the element of impulsion in the *first* sound is more or less marked. The prolongation of the first sound is due to this element. When, from any cause, this element is impaired or eliminated, the interval between the first and second sounds is lengthened. In those situations on the chest in which the valvular element is heard without the element of impulsion, this interval is distinctly longer than when the two elements are combined as they usually are over the apex.

7. The *second* sound has an unmixed valvular quality, and is

[1] This is opposed to statements made by some writers: for example, Forget says, "Lorsqu'un des deux bruits vient de manquer, c'est généralement le second, comme le plus faible." Précis théorique et pratique des maladies du cœur. The fact is precisely the reverse of this.

best studied over the base of the organ, where its relative intensity, in most persons, exceeds that of the first sound. The points where its characters are generally best marked, are the intercostal spaces between the second and third ribs on the two sides near the sternum.

8. On comparison of the *second* sound on the two sides at the points just named, a difference in pitch and other characters is generally apparent. This fact, taken in connection with the anatomical relations of the aorta and pulmonary artery at these points, and also with clinical facts pertaining to disease, leads to the conclusion that when such a disparity exists, the characters of the sound on the left side are due to the action of the valves of the pulmonary artery, and the characters of the sound on the right side proceed from the aortic valves.

9. The *second* sound presents the characters of that produced at the orifice of the pulmonary artery, in a small proportion of instances in the third intercostal space on the left side, and over the body of the heart in the superficial cardiac region. In a larger proportion of instances it presents these characters over the inferior border of the heart. Elsewhere, within the præcordia, and at points removed from the præcordial region, wherever the *second* sound is heard, it presents the characters distinctive of the sound produced at the aortic orifice.[1]

10. The *second* sound is not subject to great variation, even as regards its intensity, in the same person, and it maintains its distinctive characters unaffected by the causes which affect the movements of the heart within the limits of health, such as exercise, mental agitation, etc. It remains unchanged under circumstances which alter considerably the characters of the *first* sound.

11. Although generally the relative intensity of the *second* sound is notably greater over the base than over the apex of the heart, the absolute intensity of this sound is often not less, and sometimes even greater over the apex, than over the base. It may even be accentuated in the latter situation in health.

12. It follows from facts contained in this summary (No. 9), that the *second* sound produced at the aortic orifice has a degree of intensity much greater than that at the pulmonary orifice; and it also follows from facts contained in this summary (No. 4), that the

[1] The first intercostal space on the left side is to be excepted from this statement.

intensity of the valvular element of the *first* sound is due to the mitral, much more than to the tricuspid valves.

THE HEART-SOUNDS IN DISEASE.

The importance of the abnormal modifications of the heart-sounds has not hitherto been duly estimated. In treatises devoted specially to diseases of the heart, this subject is dismissed with brief consideration. The attention of observers and writers has been occupied more particularly with the *murmurs*. The study of the latter has shed much light on the diagnosis of heart affections. But important as are the auscultatory phenomena pertaining to the murmurs, it must be acknowledged that they have but a limited value. Valvular lesions give rise to murmurs usually, but not invariably; hence, the absence of a murmur is not proof that lesions do not exist.[1] Endocardial and exocardial murmurs, it is true, with due knowledge and care, can generally be discriminated, but the best auscultators confess that the distinction is sometimes difficult and even impossible. The presence of a bellows murmur does not denote, in itself, the existence of organic disease. It may be inorganic or anæmic; that is, dependent on abnormal conditions of the blood and circulation, the heart being free from any lesion of structure. Inorganic murmurs, it will be granted, can usually be distinguished from those incident to organic disease, but without that confidence which is only to be derived from considerable experience, the diagnostician is frequently in doubt on this point. Assuming, however, not only that a murmur is known to be endocardial and organic, but that, by means of certain rules, the lesion giving rise to the murmur is referred to a particular situation, *i. e.*, either the aortic or mitral orifice; and still more, that either contraction or insufficiency at one or both these orifices is ascertained, it does not enable the practitioner to decide as regards the extent of injury and the amount of danger involved. The intensity and other characters of murmurs do not guide us to a knowledge of the nature and degree of damage which the heart has received. An intense and rough murmur may be due to physical changes

[1] Dr. Stokes has reported some cases strikingly illustrative of the correctness of this statement. *Vide* Treatise on the Heart and Aorta. American edition, p. 159 et seq.

which are not attended either by obstruction or insufficiency, giving rise to no unpleasant symptoms and unattended by any immediate danger. On the other hand, changes of a most serious character may be accompanied by a murmur so weak and soft as to escape detection without careful examination. In short, the limits of the value of the murmurs are reached when they have enabled us to determine the existence of organic disease and its situation. It would be easy to adduce evidence of the correctness of this statement, but it will probably not be questioned by any who are familiar with the application of auscultatory phenomena to the diagnosis of cardiac diseases.[1]

The study of the abnormal modifications of the heart-sounds opens a field of research which promises to supply that which the study of the murmurs fails to furnish, viz., the means of determining the extent of injury which valvular lesions have occasioned. Taken in connection with murmurs, they serve to extend still further the information which we derive from these. By combining the auscultatory phenomena relating to the heart-sounds, with those which relate to murmurs, we may hope to be able to add to our knowledge of the existence of valvular lesions and of their situations, data for ascertaining the amount of damage which the valves have sustained. As an object in diagnosis, the latter, it is clear, is especially important, inasmuch as the danger depends, not so much on the existence and situation of lesions, as on their nature and extent; and if it be true that such an advantage is to be derived from the study of the heart-sounds, it is gratuitous to say more in behalf of the claims of this study on the attention of the medical practitioner.

The clinical study of the heart-sounds in disease, is based on the clinical study of the heart-sounds in health. The conclusions to which the latter study has led us, involve certain corollaries relating to disease, theoretically probable, but which are to be substantiated by the results of clinical experience. But the clinical study of the phenomena incident to disease, is attended with greater difficulty than observation of the phenomena pertaining to health. We cannot collect a series of cases which we have made subjects of leisured investigation at our convenience. We are obliged to

[1] For testimony to the correctness of all these statements, by a justly distinguished observer of large experience, the reader is referred to the late treatise on Diseases of the Heart and Aorta, by Dr. Stokes.

take them as they chance to fall under observation. Moreover, to settle the various points of inquiry which arise, a larger collection of cases is requisite than suffices for studying the phenomena of health; and to render the study of morbid phenomena complete, we must add to our observations during life, the abnormal conditions found after death. With reference to the present subject, viz., the study of the heart-sounds in disease, I do not profess to have accumulated clinical facts sufficient to settle every point of inquiry. In proceeding to treat of the subject, I shall indicate questions to be definitively answered only by an accumulation of evidence requiring more opportunities for observation than fall to the lot of a single observer within the period that my studies have had this direction. With respect to the clinical study of the heart-sounds in health, as a point of departure for the study of their abnormal modifications, I will add, that, not only are the results of the former study necessary as a basis of the latter, but the exploration of the healthy chest furnishes a ready means of becoming practically familiar with auscultation as applied to cardiac phenomena. For one really desirous of engaging in this province of clinical study, an essential preliminary exercise is the verification, in a number of healthy persons, of the facts presented in the first part of this essay.

In treating of the heart-sounds in disease, as in health, the two sounds are to be considered under separate heads; and to preserve uniformity of arrangement, I will take up, *first*, the second or diastolic sound; and, *second*, the first or systolic sound.

I. The Second, or Diastolic Sound.—The abnormal modifications of the second sound chiefly relate to its presence or absence in certain situations, and to variations of intensity. In other characters than intensity, it is not subject to marked alterations as a result of disease, in this respect differing from the first sound. In connection, however, with variations in intensity, its valvular quality may be more or less impaired. We have seen that the sound emanates from two distinct sources, viz., the aortic and the pulmonary orifices, and that in the second intercostal space near the sternum, on the two sides, the sound from these two sources, respectively, may generally be discriminated by different features pertaining to pitch and other characters. The sound on the right side, referable to the aortic orifice, we may distinguish as the aortic sound, and that on the left side in the cases in which it is distin-

guishable, may be called the pulmonary sound. Were there room for doubt respecting the distinct sources of the sound in these two situations, on the ground that the difference in characters observed in health does not constitute evidence sufficient to warrant that conclusion, it is abundantly corroborated by facts pertaining to disease. Some of these facts have been already cited. The correctness of the conclusion may therefore be assumed, and we may consider the aortic and the pulmonary sound separately, as presenting abnormal modifications which constitute physical signs of disease.

The pulmonary second sound may be well marked at the base of the heart on the left side of the sternum, when the aortic sound is entirely wanting. This fact was exemplified in the case of a hospital patient who remained under observation for a long time before his death, the aortic valves being found, on examination after death, to be expanded and perfectly rigid, with great contraction at the aortic orifice.[1] The second sound was in this case marked in the left *third* intercostal space, and not elsewhere discoverable; the heart was greatly enlarged, a *cor bovinum*, and that the pulmonary sound was present in the third, and not in the second intercostal space, was probably owing to the base of the organ falling below its usual level, in consequence of its increased weight. This case warrants a conclusion already drawn from the examinations of the healthy chest, viz., that the sound produced at the pulmonary artery, even when well marked at the base on the left side, is not readily propagated at a distance from this situation, in this respect differing from the aortic sound which is usually heard, not only over the præcordia, but at points on the chest remote from this region.[2]

Is the pulmonary sound ever abnormally weakened? This is probably an effect of certain abnormal conditions of the right ventricle, but the question is not easily decided, practically, in individual cases, since, in some healthy persons, the distinctive characters of the sound are merged in the preponderating aortic sound. Diminished intensity of the pulmonary sound, therefore, or its absence, can hardly be recognized as physical signs of disease.

May the intensity of the pulmonary sound be abnormally in-

[1] Case of Murray, H. Records, vol. xii. p. 57.

[2] This point was illustrated in another case, which will be cited farther on, of a patient examined an hour before death. Myers, P. Rec. (vol. ix. p. 570).

creased? Prof. Skoda, of Vienna, attaches much importance to an exaggerated intensity of this sound, regarding it as a reliable sign of hypertrophy of the right ventricle, in cases of either mitral regurgitation, or obstruction. If it possess the significance attributed to it by Prof. Skoda, it is truly a sign of not a little value, since it becomes an indication that the heart has begun to suffer from the reacting influence of the obstruction, or the regurgitant current. This is far more important to be known than the mere fact that mitral insufficiency or contraction exists, for clinical observation teaches that these effects of mitral lesions may continue for a long time without inducing any appreciable inconvenience; but so soon as enlargement of the organ ensues, unpleasant consequences are likely to occur.

This opinion of Prof. Skoda is founded on an hypothesis which appears to be generally adopted, referring the expansion of the semilunar valves to the recoil of the coats of the artery, as a result of the prior distension produced by the column of blood in its direct current. If the elasticity of the vessel be thus the chief source of the force which occasions the expansion of the valves, it is evident that the force should be commensurate with the power with which the systolic contraction takes place, and that it will also be increased by an obstruction to the current of blood in any part of the arterial systems. Now, in cases of either mitral contraction or insufficiency, we have first an obstruction in the pulmonary circulation, and, consequently, sooner or later, enlargement of the right ventricle. When the latter result obtains, we may expect, according to Prof. Skoda, an exaggerated second sound, referable to the pulmonary valves. Did it enter into the scope of this essay to discuss hypotheses, I should argue against that just mentioned, as inadequate to account for the production of the second sound of the heart. Adopting it as explaining, to some extent, the mechanism by which this sound is produced, a more powerful agency seems to me to belong to the ventricular diastole, which, in the experiments made by Dr. Hope and others, was observed to take place in a sudden, forcible manner, synchronously with the occurrence of the second sound, and which, in some of these experiments, and also in the case of ectopia observed by Cruveilhier, was felt by the hand to be not merely muscular relaxation, but an actual dilatation. I should not have indulged in even these few remarks on this topic, except that the view just offered seems to be established by clinical facts which will be mentioned in another

connection. Prof. Skoda's opinion, however, is to be verified or disproved, not by arguments with reference to the hypotheses by which it is attempted to render the opinion plausible, but by the touchstone of clinical experience. Is it found to be the rule that, when mitral insufficiency or contraction exists sufficiently to involve obstruction to the pulmonary circulation, and to lead to enlargement of the right ventricle, the second sound referable to the valves of the pulmonary artery acquires an abnormal intensity? This question indicates the means by which the point of inquiry is to be settled.

The testimony, in general terms, of other distinguished observers (Stokes, Walshe), conflicts with that of Prof. Skoda. As regards my own experience, since my attention has been directed to this point, I have found, in cases of mitral lesions involving either regurgitation or obstruction, or both, the intensity of the pulmonary sound apparently increased, that is, the second sound more intense on the left than on the right side, at the base, in most instances, but not invariably. For example, in a case which has quite recently fallen under observation, of both contraction and insufficiency at the mitral orifice, with hypertrophy and dilatation of the right ventricle, as determined by an examination after death, the second sound at the base was notably more intense on the *right* than on the *left* side.[1]

But in many instances, whether the pulmonary sound be really exaggerated or not, is with difficulty determined. This sound has no fixed degree of intensity in health. Different persons differ in this regard. As a rule, its intensity is less than the aortic sound at the base, on the right side of the sternum. Now, if from any cause the intensity of the aortic sound be diminished, that of the pulmonary sound becomes relatively greater. Mitral contraction, or insufficiency, obviously tends to weaken, more or less, the sound produced at the aortic orifice, and it is probable that when, in connection with mitral lesions, the second sound is found to be more intense at the base on the left, than on the right side, the fact is oftener due to the diminution of the aortic, than to an absolute increase of the intensity of the pulmonary sound. On the other hand, the pulmonary sound may be notably more intense than the

[1] Case of Bannister, P. Records, vol. x. 192. In this case the *left* ventricle, as well as the right, was hypertrophied, and perhaps the co-existence of hypertrophy of the *left* ventricle will explain the exceptions to the rule.

aortic, when there is no disease at the mitral orifice. In illustration of this, I will cite an instance in which I was in a measure led astray in localizing the lesions, by the doctrine of Skoda. A patient presented, with evidences of enlarged heart, a rough systolic murmur, having its maximum of intensity at the apex, being feeble at the base, and not propagated to the left of the præcordia, as is usual in cases of mitral regurgitation. But, in view of the situation of the maximum of the murmur, and the fact that the pulmonary second sound was in a marked degree more intense than the aortic, I referred the lesion to the mitral orifice. The autopsy disclosed no mitral disease, but large, pendulous vegetations attached to the inferior surface of the aortic valves, impeding the play of these valves, and involving contraction of the orifice. The murmur was, in fact, not aortic, but intra-ventricular; and, hence, its non-diffusion beyond the heart toward the left lateral surface of the chest; and the aortic sound was weakened by the condition of the valves.[1]

In conclusion, an increased intensity of the second sound, referferable to the pulmonary valves, whether relative or absolute, is not without importance as a sign of mitral lesions, involving either obstruction or regurgitation, but it is not a sign so significant and reliable as it appears to be regarded by Prof. Skoda.

Of sixteen cases of mitral disease, involving either regurgitation or obstruction, in the histories of which I have noted the facts relative to this point, in twelve the greater relative intensity of the pulmonary sound was more or less marked; in three, the aortic sound at the base exceeded the pulmonary in intensity, and in one, the intensity on both sides was about equal.

The sound referable to the aortic orifice is subject to abnormal modifications more frequent and marked than those of the pulmonary sound, inasmuch as the valves of the aorta are often the seat of disease, while organic lesions of the valves of the pulmonary artery are extremely rare. The sound may be abnormally increased in intensity, weakened, or extinguished.

Increased intensity of the sound, if the valves are normal, occurs in a marked degree when the left ventricle is hypertrophied. The exaggeration of the sound is not only apparent at the base of the heart on the right side of the sternum, but at points on the chest more or less removed from the heart, to which the sound is pro-

[1] Case of Stone, Hospital Records, vol. xiii. p. 127.

pagated. The preponderance of the aortic over the pulmonary sound on the left side of the sternum at the base, is marked under these circumstances.[1] The intensity of the sound is not only evidence of the integrity of the aortic valves, but it is, to some extent, an index of the power of the systolic and diastolic movements of the left ventricle. Taken in connection with other signs, it contributes to denote the extent, as well as the existence of hypertrophy of this ventricle. The intensity of the sound depends more on the ventricular movements than on the quantity of blood propelled with each systole through the aorta. Thus, the sound was remarkably intense in a case of mitral disease in which the valves were united at their sides, contracting the orifice to a linear aperture, scarcely admitting the end of the index finger, and allowing regurgitation, the left as well as the right ventricle being hypertrophous.[2] This fact suffices to show that the intensity of the second sound in either the pulmonary artery or the aorta, is not due chiefly to the elasticity of the arterial coats, and consequent recoil after their distension by the column of blood propelled into the vessel by the systolic contraction. It confirms the view respecting the agency of the diastole in the production of this sound, which has already been presented.

An exaggerated intensity of the aortic sound, however, is alone by no means evidence of hypertrophy. Its significance depends on the coexistence of other signs denoting enlargement of the heart. The sound becomes exaggerated, when, from any cause, the power or the action of the heart is increased. In certain cases of functional disorder, especially in females, the sound is remarkably intense, more so, indeed, than in most cases of hypertrophy. As a sign of the latter organic affection, it holds a subordinate place among the physical signs on which the diagnosis is to be based.

Abnormal weakness of the sound, and its extinction, constitute physical signs more significant and valuable than increase of intensity. Weakness of the sound may denote either injury of the aortic valves, or enfeebled action of the heart from various causes. Impaired muscular power of the left ventricle, however, does not

[1] This is in opposition to the statement of Hope. This distinguished observer, however, appears to study the second sound exclusively in the *left* second intercostal space. Moreover it accorded with his theoretical views to consider the two sounds of the heart as weakened in hypertrophy.

[2] Case of Bannister, P. Records, vol. x. p. 192.

lessen proportionately the intensity of the aortic sound. This sound is not only appreciable, but well marked in cases of disease in which the action of the heart is so feeble that the first sound is wanting. In a case now under observation, in which the signs and symptoms point clearly to fatty substitution, the first sound is not heard even over the apex of the heart.[1] Yet, the aortic second sound is distinct both at the base and apex;[2] the latter sound is weakened, but not in a degree corresponding to the reduction of the muscular power of the organ as evidenced by other signs. Here, again, is clinical proof that the intensity of the second sound does not represent mainly the ventricular systole, but is dependent, to a greater or less extent, on the sudden, quick diastolic movement which follows the systolic. A notable degree of weakness of the aortic sound, then, usually proceeds from lesions compromising the integrity or function of the aortic valves; and especially this inference is to be drawn, if other evidence of impaired muscular power of the heart be wanting.

In connection with the diagnosis of lesions at the aortic orifice, the aortic sound is of great importance. Having determined the existence and seat of a valvular lesion, the question arises, to what extent are the valves compromised? It is of far greater moment to be able to answer this question, than to determine the existence of a lesion, for, whether the latter be serious or otherwise, depends on the extent to which it involves insufficiency, or contraction, or both.

An aortic murmur (having determined that it is not inorganic) indicates an aortic lesion. We cannot predicate on the presence of the murmur much beyond this fact. If the murmur be *systolic*, it may be due to an aortic lesion situated above the valves and in no degree affecting them; or the physical conditions giving rise to the murmur may not be such as to interfere materially with the function of the valves. If the murmur be *diastolic*, it does not necessarily involve the fact of regurgitation. Clinical observation has shown that calcareous projections within the aorta, may give rise to a murmur occurring with the retrograde current of blood, the valves remaining perfectly sound.[3] But assuming insufficiency

[1] The term *fatty substitution* is used as being a more accurate expression than *fatty degeneration*.

[2] Case of Milne. H. Records, vol. xiii. p. 200.

[3] *Vide* Andry on Diseases of the Heart.

of the valves to be predicated on the diastolic murmur, it does not indicate the extent of the insufficiency. It is true that the coexistence of the enlargement of the heart and the symptoms denoting disturbance of its action, enable us to judge respecting the seriousness of the lesion; but it is often desirable to form an opinion on this point before these effects have taken place. Attention to the aortic sound in connection with the murmur, will enable us frequently to determine whether the valves are injured or not, and, if injured, to form some idea of the extent of the damage which they have received. Has the aortic sound the intensity and the valvular quality which it is found to have in health, not only at the base of the heart, but at the apex and in other situations, we have a right to infer that the valves are not yet seriously compromised, whatever may be the intensity or other characters pertaining to the murmur. The danger incident to the lesion is remote, not immediate. A systolic aortic murmur, under these circumstances, may exist for a long period without the development of symptoms denoting serious cardiac trouble. The following case affords an illustration of this fact: a blacksmith, aged 60, entered the hospital with amaurosis. Six years before, he had suffered from rheumatism, and attacks of this disease, in the mean time, had been repeated every winter. The evidences of enlargement of the heart were wanting. A systolic bellows murmur was present, having its maximum in the second intercostal space on the right side; nearly as intense in the first intercostal space on the same side; feeble and distant over the body of the heart. The second sound at the base on the right side, was very distinct, clear, sharp, and pure; its intensity greater than on the left side. The patient complained of no difficulty referable to the heart, except slight deficiency of breath on active exercise. This would not prevent him from continuing to labor as a blacksmith, were he not affected with amaurosis.[1]

A diastolic murmur referable to the aorta, generally, although not invariably, as already stated, denotes regurgitation. But if, in connection with this murmur, we find a well-marked valvular aortic sound, we are warranted in inferring that the insufficiency is not great, and we may venture to hope that the serious consequences of regurgitation may be remote.

In another point of view the normal intensity of the aortic sound

[1] Case of Bonn. H. Records, vol. xii. p. 313.

is of importance, taken in connection with a diastolic murmur, viz. it assists us in referring the murmur to its proper seat. A diastolic murmur may be produced by an aortic regurgitant current, or by a direct current through the mitral orifice. Some writers have discredited even the possibility of a murmur being due to the latter. It is, however, not only certain that a murmur may be thus produced, but instances, it is highly probable, are not very infrequent. To refer the murmur to this orifice is rendered difficult by the fact that an aortic regurgitant murmur has its maximum of intensity, often, if not generally, not at the base of the heart, but over the body of the organ, where we might expect, at least in some instances, to find most marked a murmur produced by the direct current of blood through the mitral orifice. The coexistence, or otherwise, of the normal intensity and quality of the aortic sound, has an obvious bearing on this problem in diagnosis. If this sound be unimpaired, the fact points to the mitral orifice as the source of the murmur; but if the sound be weakened and its valvular character lessened, and, still more, if the sound be extinguished, we are led to refer the murmur to a lesion of the aortic valves rendering them more or less insufficient. The following cases are cited in illustration of the point just stated: A private patient, aged 20, who had had repeated attacks of acute rheumatism, presented the signs of enlarged heart with a single bellows murmur which followed the second or diastolic sound, and was continued through the post-diastolic silence quite to the first or systolic sound. This murmur was scarcely heard at the base of the heart; its greatest intensity was on a transverse line intersecting the nipple, over and on either side of the sternum. Below this line it was propagated farther than the sounds of the heart, and was heard on one occasion nearly as low as the umbilicus. The second sound was unusually intense, and its valvular quality strongly marked at the base on either side.[1] The conclusion that the diastolic murmur in this instance was mitral, hinged mainly on the notable intensity of the aortic second sound. Certainly if a murmur propagated to such a distance below the heart, were aortic, we should expect diminution rather than increased intensity of the aortic sound. This patient is living, and, except that he wants breath for active exercise, considers himself in good health. The latter fact militates against the existence of aortic regurgitation; for while a condition of the

[1] Case of Page, P. Records, vol. ix. p. 201.

mitral orifice which may give rise to a murmur with the direct current, does not necessarily affect the heart either immediately or remotely to much extent, aortic regurgitation is always a serious result of valvular disease. The difference in gravity between a mitral lesion which may give rise to a diastolic murmur, and an aortic lesion involving regurgitation, invests the discrimination with more importance than belongs to it simply as affording an occasion for the display of diagnostic acumen.[1]

Another case illustrating the same point is as follows: The patient, a male aged 21, had acute rheumatism seven years ago. He has been conscious of trouble connected with the heart only during the last few months. He is sensible of a powerful action of the organ and occasional irregularity in its movements. He is short-winded on active exercise, but does not suffer from dyspnœa, either habitually or in paroxysms. He is engaged in active business and does not consider himself an invalid. The heart is enlarged. The apex-beat is forcible and attended by shock in the præcordia. At the base, the two sounds are heard on each side. The first sound is confused, indistinct, and more marked on the left than on the right side. The second sound is louder and more acute in the right than in the left second intercostal space, and accompanied by a low soft bellows murmur. This murmur is heard in this intercostal space on both sides; but is more distinct on the right side. Over the body of the heart, the first sound is accentuated, and the second sound is accompanied by a murmur louder than in the right second intercostal space. Over the apex, the element of impulsion of the first sound is marked and no valvular element appreciable. The first sound is followed by a high-pitched bellows murmur. At the left nipple, the element of impulsion of the first sound is alone appreciable, *i. e.*, there is no valvular element. The systolic bellows murmur is heard in this situation. At the xiphoid cartilage, the diastolic murmur is heard, and the first sound has a feeble valvular element. The existence of mitral disease is predicated on the systolic murmur heard at the apex and the left nipple, and not at the base of the heart. The intensity of the aortic second sound (being more intense than the pulmonary, notwithstanding mitral

[1] In determining whether a diastolic murmur be mitral or aortic, circumstances are to be taken into account, the consideration of which does not fall within the scope of this essay. For example, the visible pulsations of the superficial arteries as pointed out by Dr. Carrigan, of Dublin, and the evidence of hypertrophy of the left ventricle.

regurgitation and enlargement of the heart) leads to the conclusion that the diastolic murmur is due to the direct current through the mitral orifice rather than to aortic regurgitation. That the mitral valves are much damaged, is inferred from the absence of the mitral valvular element of the first sound. The general condition of the patient is more consistent with mitral than with aortic insufficiency.[1]

Extinction of the aortic sound, especially when the sound is replaced by a murmur, is evidence that the valves are greatly damaged. I have already cited a case in which this sound was extinguished, the pulmonary sound being distinct in the left third intercostal space. In this case, the valves were expanded and rigidly fixed, contracting the orifice to the size of a crow-quill. I have repeatedly met with instances in which the valves were so much injured as to suppress the aortic sound.[2] This is not a new point in diagnosis. Observers have appreciated its value. But its importance is not sufficiently enforced by most writers on cardiac affections, and it is apt to be overlooked by those who give more or less attention to the application of physical exploration to these affections.

It is, however, more especially to abnormal modifications affecting the intensity of the aortic sound, taken in connection with aortic murmurs, exclusive of the instances in which the sound is suppressed, that the attention of observers has been inadequately directed.

The lessened intensity of the aortic sound, due to lesions of the aortic valves, may have every degree of gradation between the slightest diminution and extinction. Now, assuming that a coexisting aortic murmur indicates the existence of lesions in this situation, how far is the abnormal weakness of the sound to be considered as a measure of the extent to which the valves are injured? In other words, what are the circumstances which are likely to affect the intensity of the sound, irrespective of the valvular lesions? Mitral regurgitation and contraction occasion more or less weakness of the aortic sound, as has been already considered. These are to be taken into account. The presence of a murmur, or murmurs (systolic, or diastolic, or both), referable to the mitral orifice, indicate the existence of lesions in this situation.

[1] Case of Guthrie, P. Records, vol. x. p. 194.

[2] Another case is cited farther on in illustration of the persistence of the pulmonary sound an hour before death. Case of Myers, P. Records, vol. ix. p. 570.

Fortunately, the absence of murmur, when lesions exist, is an exception to the rule. Enfeebled action of the heart is another circumstance which has also been mentioned. Allowance is to be made for this when we find, by other signs and by symptoms referable to the heart, that its power is impaired; but it is to be borne in mind that the second sound is comparatively little affected by feebleness of the heart's action. In illustration of this, I have cited an instance in which the first sound was suppressed, while the second sound remained distinct and well marked both at the base and apex. The following is another illustration, more pertinent in the present connection. I visited a private patient, in consultation, for the first time, an hour before his death; he was, in fact, then moribund. The exploration, under these circumstances, was very brief, and limited to auscultation. A systolic and diastolic murmur existed at the base to the right of the sternum, with extinction of the aortic sound. This double murmur was also heard over the body of the heart. A feeble apex impulse was felt, and an extremely faint systolic sound was appreciable over the point where the impulse was felt. At the base, on the left side, in the second and third intercostal spaces, notwithstanding the greatly enfeebled condition of the heart, a pretty intense pulmonary sound existed. On examination after death, the aortic valves were thickened and shrunken, so as to be notably insufficient. The left ventricle was greatly dilated and hypertrophied; the right ventricle slightly enlarged.[1]

The data obtained in a few moments by auscultation, in this case, an hour before the action of the heart ceased, sufficed for the diagnosis.

Another practical question arises in this connection, viz., what criterion have we by which to determine whether the intensity of the aortic sound be diminished or not, and which will enable us to gauge the degree of diminution? There is no ideal standard fixing the normal intensity of this, more than of the pulmonary sound. It varies in different persons within the limits of health. If mitral disease do not co-exist, the pulmonary sound will serve as a guide in judging of the fact, and of the extent of an abnormal weakness of the aortic sound. Examinations of the healthy chest teach that, normally, the aortic sound is more intense, as a rule, than the pulmonary sound. When, therefore, we find the relative intensity of

[1] Case of Myers, P. Records, vol. ix. p. 570.

the pulmonary greater than that of the aortic sound, assuming the former not to be exaggerated, an abnormal weakness of the latter may be inferred; and the amount of disparity between the two sounds enable us to estimate the degree of weakness due to valvular disease.

I have considered the abnormal modifications of the second, or diastolic sound, as relating mainly to morbid alterations of the intensity of this sound, and its extinction. Some observers have pointed out particular changes in the quality of the sound, which they have considered as significant of certain pathological conditions. M. Bouillaud, more than any other author, attaches importance to modifications of this description. He describes the sound as dull, smothered, hoarse, when the valves are thickened, swelled, spongy, or fungous; and, on the other hand, dry, loud, flapping, and like the crackling of parchment (*Parcheminé*), when the valves are abnormally dry, indurated, or calcareous. To determine, however, the kind of change which has taken place, and the particular condition of the valves, by means of the intrinsic qualities belonging to the sound, is a problem of diagnosis which cannot be solved with positiveness, and it only serves to complicate the subject to enter into these refinements of auscultation. For all practical purposes, it suffices to ascertain whether the sound be present or wanting; whether its intensity be increased or diminished, or normal; the extent to which it is diminished, and whether the valvular quality of the sound be well marked, or otherwise.

II. The First or Systolic Sound.—A correct analysis of the first or systolic sound is essential to the proper study of its abnormal modifications. The clinical study of this sound in health has led us to resolve it into two elements, viz., a valvular element and an element of impulsion. The modifications due to disease may relate chiefly, or even exclusively, to one of these elements; either element is subject to morbid alterations, as regards intensity, which do not affect, to the same extent, the other element. Each is liable to be extinguished, the other remaining intact. Being thus affected separately by disease, as well as conjointly, the auscultatory phenomena which pertain to this sound cannot be intelligible and satisfactorily applied to the diagnosis of cardiac affections, without the recognition of these two elements as, respectively, distinct subjects for clinical observation.

Laënnec observed that in cases of dilatation of the left ventricle,

the first sound lost, in a great measure, the characters which distinguish it from the second sound, becoming short and flapping like the latter. He attributed this change to the sound being, under these circumstances, more readily conducted to the ear. Dr. Hope, also, attached much importance to the first sound approximating in its characters to the second sound, as a sign of dilatation. He offered an explanation of this change different from that given by Laennec, attributing it to greater quickness of the ventricular contraction, whereby the tension of the valves occurs more abruptly. Now, in studying the sound in health, we have seen that this change may always be observed in certain situations near the præcordia, the point most favorable being a little without the left nipple. The sound in the healthy chest, both here and frequently in other situations, is as brief as the second, and has the same quality, differing only in a lesser degree of intensity and lowness of pitch. Over the body of the heart, and even over the apex, in a certain proportion of the persons in whom the apex-beat is not perceptible to the touch, the two sounds are also found to resemble each other. These facts suffice to show that the explanations of the change, when it is due to dilatation, offered by Laënnec and Hope, are alike incorrect. That the change does occur in connection with dilatation is true, but it does not possess that significance, as a sign of this lesion, which was attached to it by these distinguished observers. Clinical observation has abundantly shown that it occurs in certain instances when the muscular walls are greatly thickened, in other words, in connection with well-marked hypertrophy as well as with dilatation.[1] This, of course, disproves the hypotheses based on its supposed relation exclusively to dilatation. The simple explanation of this change, wherever it is found, either in health or disease is, that the sound is divested of the element of impulsion, leaving the valvular element isolated. This is an effect frequently of dilatation of the heart. The apex of the organ, partly because the heart undergoes an alteration in form, by which it loses its pointed extremity, and in part on account of the diminished power of its systolic movements, no longer comes in contact with the thoracic parietes with sufficient force to develop the element of impulsion. This element of the first sound disappears, the valvular element remaining more or

[1] *Vide* Billingham on Diseases of the Heart, P. I., Dublin ed., p. 127. The fact, however, I state from my own clinical experience.

less marked. But the element of impulsion is thus extinguished, not only as an effect of dilatation, but in connection with other lesions. It occurs under various circumstances which involve marked diminution of the force of the systolic movements of the heart. The latter obtains in certain instances in an advanced stage of hypertrophy, when the muscular power of the organ becomes weakened. It occurs when the organ is weakened by fatty substitution, or by softening of the muscular tissue. It may occur when weakness of the muscular power is due to a dynamic condition, as in certain cases of typhus or typhoid fever, attended with great depression of the vital forces. It may be expected to occur, also, whenever the organ is prevented from coming into contact with the parietes of the chest, as in cases of pericarditis, with accumulation of a large quantity of liquid in the pericardial sac, pleurisy with effusion into the left side, hydrothorax, emphysema affecting the left lung, etc. Clinical experience will show that the change under consideration is incident to any affection of the heart itself, or surrounding organs, which either removes the heart from the thoracic walls, or occasions great reduction of its muscular power.

It follows from the result of clinical experience just stated, that, although of the two elements which compose the first sound, it is the element of impulsion which in health preponderates over the body and apex of the heart, and, in fact, often so much so as to drown the valvular element in these situations, yet this element is most frequently impaired in affections of the heart which do not compromise the integrity of the semilunar and mitral valves. The valvular element of the first sound bears a resemblance to the second sound, not only in its intrinsic characters, but in this, viz., it is not subject in a very marked degree to alterations even in intensity, so long as the valves concerned in its production remain sound.

The morbid conditions involving extinction of the element of impulsion have been noticed. The same conditions, it is hardly necessary to remark, may occasion an abnormal diminution of the intensity of this element in any degree falling short of its extinction. The degree of diminution will, of course, be proportionate to the extent to which these morbid conditions involve either weakened muscular power or removal of the heart from the thoracic wall. But in estimating the degree of abnormal diminution, it is to be borne in mind that different persons, in health, differ considerably as regards the preponderance of the element of impulsion

in the præcordia, and that this element may even be wanting without denoting disease.

The element of impulsion may be, on the other hand, abnormally exaggerated. This obtains in hypertrophy of the left ventricle, so long as the muscular power of the heart remains unimpaired. The impulsive movements of the apex, *cæteris paribus*, is proportionate to the hypertrophy, and the abnormal increase of the element of impulsion becomes thus, to some extent, a measure of the latter. All observers have remarked that in cases of hypertrophy, when the muscular energy of the heart is in proportion to its increased size, the first sound is notably dull and prolonged. The dulness of the first sound in health is especially marked in the element of impulsion; and we have seen that the longer duration of this sound is also due to the same element. It is, therefore, perfectly consistent with these facts, and quite intelligible, that when the impulsive movements of the apex are abnormally increased, the effects on the sound are greater dulness and duration, as well as greater intensity. Mere exaggeration of the first sound is by no means, in itself, significant of hypertrophy. When the muscular action of the heart is increased, as in some instances of functional disorder, this sound becomes remarkably intense, so as sometimes to be distinctly appreciable to the ear at a distance from the chest. Both elements are exaggerated under these circumstances. This is also true in cases of pure hypertrophy; but in the latter affection the element of impulsion is relatively more exaggerated, and, hence, when the dulness and prolongation are marked, as well as the increased intensity, the modification becomes significant of this affection.

I have thus indicated briefly, but sufficiently for my present purpose, the pathological relations of extinction of the element of impulsion, abnormal diminution of its intensity and its exaggeration. I may notice here an incidental character of frequent occurrence, which evidently belongs to this element rather than to the valvular element. I allude to a metallic intonation of the first sound called *tinnitus*, *cliquetis métallique* (Laënnec) *bruit métallique*, etc., compared by writers to the sound produced when percussion is made on the back of the hand, the palmar surface being applied over the ear. Observers are agreed that this intonation has no special diagnostic significance. It occurs when the stomach is distended with gas, as shown by the gastric tympanitic resonance on percussion over the anterior inferior part of the chest on the left

side. It is undoubtedly more apt to occur when the muscular power of the heart is abnormally increased either from functional disturbance or as a result of hypertrophy. It is not, however, significant of disease unless associated with other signs. It is observed in healthy persons, especially if the action of the heart be excited by exercise or mental emotions. The practitioner should bear in mind that, as a physical sign, it has not, in itself, any special value.

Directing attention now to the valvular element of the first sound, we are to inquire to what abnormal modifications is this element liable, and what are the pathological relations of these modifications. We have seen that morbid conditions which diminish and even extinguish the element of impulsion, leave unimpaired, or at least affect comparatively less, the element under consideration. It is exaggerated by causes which, at the same time, exaggerate the element of impulsion. Thus, in certain cases of palpitation, and in cases of pure hypertrophy, if the first sound be studied in situations sufficiently removed from the apex to eliminate the element of impulsion, the valvular element (assuming that the auricular valves are sound) will be found to be abnormally intense, the second sound of the heart being, at the same time, intensified. The intensity of both sounds of the heart and of both elements of the first sound is increased under these circumstances. This element is also weakened by causes, organic or dynamic, which enfeeble the muscular power of the heart; but, as has been seen, under these circumstances, the diminution of this element is much less marked than that of the element of impulsion. The power of the heart, however, may be so greatly reduced as to extinguish the valvular element as well as the element of impulsion. I have cited an illustration of this fact, afforded by a case of supposed fatty substitution of the muscular tissue of the heart.[1]

It is chiefly with reference to the presence or absence of lesions affecting the auricular valves, and the extent to which these valves are damaged, that the study of the valvular element of the first sound is of interest and importance in diagnosis. Examinations of the healthy chest have shown a disparity between this element as heard without the left nipple, and at the lower border of the heart near the xiphoid cartilage, in some persons, sufficient to render it probable that the sound in these two situations does not emanate from the same source. This, taken in connection with

[1] Case of Mylne. H. Records, vol. xiii. p. 200.

the anatomical relations of these situations to the two auricular valves, warrants the inference that, when the disparity is observed, the sound without the left nipple is referable to the mitral, and the sound at the lower border of the heart to the tricuspid valves. Clinical observation in disease confirms the correctness of this conclusion. We may therefore consider the valvular element as consisting of a mitral sound and a tricuspid sound, which admit, in certain instances of health and disease, of being studied separately. Valvular diseases, so far as they affect directly the valvular element of the first sound of the heart, relate almost exclusively to the mitral valves. Lesions affecting the tricuspid valves, as well as the semilunar valves of the pulmonary artery, it is well known, are extremely rare, whereas lesions of the mitral are more frequent than those of the aortic valves.

Mitral lesions, as well as aortic, generally give rise to a murmur. This is certainly the rule, but it is not less true that exceptions to the rule occur. The absence of a murmur, then, is not conclusive evidence against the existence of a lesion. This murmur may be systolic or diastolic, the former being vastly more frequent than the latter. The intensity of a systolic murmur due to a regurgitant current into the left auricle, is no criterion of the amount of damage incident to the mitral lesion. In my collection of cases I have the notes of an examination of a patient made nine years ago, in which a mitral regurgitant bellows murmur existed so loud as to be heard over the whole left side of the chest, even when the ear was applied over the dress. This patient was then eleven years of age. She has since grown into womanhood, and, until lately, has had tolerable health, the murmur having lost nothing of its intensity. The lesion had probably existed for five years prior to my first examination.[1] In another instance, of a person still engaged in active business and apparently in good health, an intense murmur existed more than ten years ago. In still another case, a loud murmur was observed five years ago, and the lesion probably was to be dated from an attack of rheumatism that had occurred ten years before. This patient is a lady who now considers herself in excellent health, but the murmur remains.[2] In these similar cases, the injury of the valves, although sufficient to

[1] Case of Miss P. P. Records, vol. vii. p. 112.

[2] Case of Miss I. P. Records, vol. viii. p. 284. Cases similar to these have been reported by Dr. Stokes; *vide* Treatise on the Heart and Aorta, American edition, p. 166 et seq.

occasion a loud murmur, is not sufficiently great to give rise to serious results. On the other hand, in connection with an amount of injury involving grave consequences, the murmur may be feeble, limited to a small area and even entirely wanting. Again, a mitral murmur may accompany slight endocarditis, continue for a short time and disappear. In such instances it is not to be supposed that regurgitation occurs, the murmur probably being due to a deposit of lymph which is gradually washed away. I can recall several cases illustrative of this fact, which have fallen under my observation.

It is plain, then, that in order to judge whether lesions, the existence of which is indicated by the presence of a murmur referable to the mitral orifice, are of a nature to compromise the functions of the valves, and to form an opinion as regards the extent to which they are compromised, other evidence than that afforded by the murmur is requisite. Attention to the mitral valvular sound, in connection with the murmur, furnishes, at least in certain instances and in some measure, the requisite evidence. The sound is to be studied at a point on the chest where its source is not doubtful, and where it may be disconnected from the element of impulsion. This point, already more than once stated, is without the left nipple, more or less removed from the left border of the heart. Is it found that in this situation the valvular element is well marked, the inference is to be drawn that the lesion, although furnishing the physical conditions necessary to the production of a murmur, perhaps intense, does not involve an amount of injury to the valves sufficient to impair materially their functions. On this inference may be based an opinion concerning the importance of the lesion, as regards liability to those effects on the circulation and the heart, which are dependent on injury or destruction of the valves. So long as the valvular element referable to the mitral valves remains nearly or quite normal, so long the danger incident to serious lesions of these valves is remote. It is easy to see that our opinion on this point is not only of interest to the patient with reference to his hopes or fears, but it will influence very materially the measures to be indicated in the management of the case.

Does feebleness of the mitral sound, or its extinction, denote a corresponding degree of damage to the valvès? An unqualified answer to this question in the affirmative, would doubtless involve a liability to practical errors. Other causes than the lesion of the valves may weaken or suppress the sound. Diminished muscular

power of the heart is one of these. A murmur may be so loud or rough, and extend so far beyond the borders of the heart, that it obscures or drowns the sound. These contingent causes are to be taken into account. Fortunately, they are causes which may be appreciated in individual cases. It is, of course, at once apparent whether the murmur be intense, or rough, or widely diffused; if so, we are precluded from drawing a positive inference from the feebleness or absence of the valvular element of sound, as to the condition of the valves.

It is also generally easy to ascertain whether the muscular power of the heart be diminished or not. The effect of weakened action of the organ, as we have seen, is to lessen, in a marked degree, the intensity of the element of impulsion of the first sound. The valvular element is, then, to be compared with the element of impulsion. If over the apex of the organ, the latter element be well or strongly marked, while, without the left nipple the valvular element is feeble or extinct, and the latter be not obscured or drowned by a murmur, it is a rational inference that the mitral valves are seriously compromised. This inference is not admissible, if, on the other hand, the element of impulsion be found to be feeble or wanting. A notable disparity between the two elements of the first sound, compared in the situations in which they are respectively most intense in health, is thus significant of injury or destruction of the mitral valves.

The mitral valvular sound may also be compared with that referable to the tricuspid orifice. The latter, in health, as we have seen, is, in general, much more feeble than the former. In disease this relation is sometimes reversed, the tricuspid valvular sound becoming the more intense of the two. This may be owing, not only to an abnormal diminution of the intensity of the mitral, but to an abnormal increase of the intensity of the tricuspid sound. The tricuspid sound, as well as the mitral, may be morbidly increased or diminished. The modifications of this sound, however, are of less importance than those of the mitral, because lesions of the tricuspid valves are of such rare occurrence.[1] When it is

[1] Dr. Blakiston (*Diseases of the Chest*, 1848), collected a large number of cases, falling under his own observation, of tricuspid lesions, as he regarded them. These cases were reported to show that tricuspid disease always exists, when general dropsy occurs, dependent on a cardiac affection. Other observers have not found lesions in this situation, even in a large proportion of the instances of cardiac dropsy. The correctness of Dr. B.'s observations may therefore fairly be questioned.

weakened or exaggerated, it is generally owing to the condition of the right ventricle. Enfeebled action of the heart diminishes the intensity of this, more than that of the mitral sound, and the former is suppressed sooner than the latter. On the other hand, whenever, from any cause, the power or action of the heart, as a whole, is increased, the intensity of this sound is augmented. The significance of these alterations is slight so long as the mitral sound is, at the same time, proportionately either diminished or augmented. But, if the tricuspid sound be found to be abnormally intense, while the mitral sound is weakened or extinct, the fact points to lesions impairing the function of the mitral valves, and consequent hypertrophy of the right ventricle. The significance of the fact is the same as an exaggerated second sound referable to the pulmonary artery, under similar circumstances. I have noted this fact in some cases of mitral regurgitation. Of its constancy, and consequent reliability as a sign of hypertrophy of the right ventricle, consequent on either mitral obstruction, or regurgitation, I am not prepared to speak from an adequate amount of clinical experience. If it be not entitled to as much confidence as the exaggerated pulmonary second sound, it may, at least, serve to strengthen the significance of the latter, when associated with it. But I have reasons for believing that, in some cases, an exaggerated tricuspid sound may denote hypertrophy of the right ventricle, when the pulmonary second sound is not exaggerated. The instance which follows, is cited in illustration of the correctness of the statement just made. A hospital patient admitted with intercostal neuralgia, complaining of no symptoms referable to the heart, presented the following physical signs: Superficial cardiac region not much increased, no heaving of præcordia. Feeble apex beat in the fifth intercostal space, just within the vertical line of nipple. A strong systolic impulse in the epigastrium, evidently referable to the heart. At the base, both sounds feeble, and no exaggeration of the pulmonary second sound. Over the apex, a systolic bellows murmur, soft, and rather acute; loudest a little removed laterally to the left from the point of apex beat; feeble over the body of the heart. Without the left nipple, the valvular element of the first sound well marked. To the right of the scrobiculus cordis, the first sound purely valvular, and louder than at the left nipple; obviously louder than natural.[1]

[1] Case of Dixon, H. Records, vol. xiii. p. 156.

The murmur in this case points to mitral regurgitation, but the valvular element at the left nipple denotes that the mitral valves are not greatly damaged. The impulse in the epigastrium, and the situation of the apex beat, show that the moderate enlargement of the heart is due mainly to increase of the size of the right ventricle. The auscultatory signs corroborative of the conclusion that the right ventricle is hypertrophied, is, in this instance, an exaggerated tricuspid sound, an exaggeration of the pulmonary second sound not being appreciable.

In treating of the pathological relations of the heart-sounds, I have considered the abnormal modifications which are due to diseases of the heart. In studying these, as constituting signs of cardiac affections, it is important to bear in mind that diseases affecting the parts surrounding the heart, may give rise to abnormal modifications of the heart-sounds.

The significance of the signs derived from this study, so far as concerns diseases of the heart, of course depends on the exclusion of extrinsic circumstances which affect the sounds. The heart, as is well known, is liable to be removed from its normal situation by certain affections pertaining to the pulmonary organs, viz., pleurisy with effusion, hydrothorax, pneumothorax, emphysema, and phthisis, in its advanced stage. Of course, under these circumstances, the facts relating to the heart-sounds, in the different situations in which they have been studied in health, do not hold good; and the abnormal modifications have not that significance of pathological conditions pertaining to the heart, which belongs to them when the latter organ is the seat of disease, exclusive of the other thoracic viscera. Solidification of lung-substance, the heart remaining in its normal situation, disturbs the rules of health, as respects the propagation of the sounds beyond the limits of the organ. Thus, a tuberculous deposit in the upper lobe of the left lung, may render the second sound notably more intense in the second intercostal space on the left, than on the right side of the sternum. As a physical sign of tuberculosis, in certain instances this is of considerable importance, taken in connection with other signs. In the infra-clavicular region, deviations from health as regards the intensity of the heart-sounds, often become important physical signs of tuberculous disease. And in this point of view, the facts obtained by examinations in health are to be borne in mind. To recur to these facts, we have seen that in the right infra-clavicular region the second sound, as a rule, predominates in intensity over the

first, and on the left, the first frequently predominates over the second sound. Hence, if this rule of health be reversed, and the second sound be found to be more intense on the left side, or the first sound more intense on the right side, assuming the situation of the heart to be normal, the existence of pulmonary disease is to be inferred.

In concluding the consideration of the *heart-sounds in disease*, I will briefly recapitulate, in the following summary, the practical views which have been presented.

SUMMARY OF CONCLUSIONS RELATING TO THE HEART-SOUNDS IN DISEASE.—1. The two elements which compose the *first* sound of the heart, viz., the valvular element and the element of impulsion, may be affected conjointly but unequally; or one element may be affected exclusive of the other, and either may be extinguished while the other remains.

2. Of the two sounds which unite to form the valvular element, viz., the mitral and the tricuspid, the former may be abnormally diminished in intensity, or extinguished, while the latter continues, and its intensity is in some instances greater than in health. When this is the case, injury or destruction of the mitral valves is indicated. An abnormal intensity of the tricuspid sound, under these circumstances, denotes hypertrophy of the right ventricle, and there will probably be found, at the same time, exaggeration of the pulmonary *second* sound of the heart.

3. To determine whether weakness or extinction of the mitral valvular sound be due to injury or destruction of the mitral valves, or to diminished muscular power of the heart's action, this sound is to be compared with the element of impulsion. If the latter element, over the apex of the heart, be well marked, while the valvular element without the left nipple, be feeble or wanting, it is to be inferred that the mitral valves are more or less seriously damaged. This inference, however, is not to be drawn if it be suspected that the mitral sound is not appreciable or imperfectly heard, in consequence of the intensity, roughness, or diffusion of a co-existing murmur.

4. On the normal intensity of the mitral valvular sound, when a murmur, is present referable to the mitral orifice, may be predicated the opinion that the abnormal changes giving rise to the murmur, have not, as yet, compromised seriously the integrity or function of the mitral valves.

5. When morbid conditions exist, organic or inorganic, which intensify the *first* sound of the heart, in hypertrophy and functional disorder, the intensity of both elements of this sound is increased, but the element of impulsion is exaggerated disproportionately to the valvular element. So, also, when the muscular power of the heart is weakened by any cause, the auricular valves remaining unaffected, the element of impulsion is enfeebled more than the valvular element, and the latter is sometimes lost when the former is still appreciable. Both elements, however, may be extinguished by causes which weaken the muscular power of the heart, while the *second* sound continues to be heard in different situations.

6. If, from any cause, the *first* sound be weakened so as to extinguish the element of impulsion but not the valvular element, this sound, in duration and quality, resembles the second sound. When this is observed over the apex of the heart, where the element of impulsion is most marked in health, it does not follow that the heart is dilated. Weakness of the systolic movement is alone indicated, and this change in the duration and quality of the *first* sound, at the point stated, occurs in cases of great hypertrophy as well as dilatation, if the muscular power of the organ be sufficiently impaired. The same change may occur when the muscular power of the heart is impaired by fatty substitution, softening, and by dynamic causes.

7. Abnormal intensity of the element of impulsion occurs when the muscular action of the heart is increased from any cause. Mere abnormal intensity may not indicate more than the increased action due to functional excitement, but if the *first* sound be notably prolonged and dull (characters which depend on the element of impulsion), hypertrophy is indicated. The absence of these characters, however, is not evidence against the existence of hypertrophy, since the muscular power of the organ may be diminished to an extent to weaken and even extinguish the element of impulsion, when the organ is greatly hypertrophied.

8. The *second* sound of the heart being constituted by a valvular element alone, is not subject to modifications which are practically important, except as regards its intensity and the degree of valvular quality. It may be exaggerated, weakened, or extinguished, and the valvular quality more or less marked.

9. The *second* sound emanating not from one source, but consisting of an aortic and pulmonary sound, which are distinguishable from each other in certain situations in health, the abnormal modi-

fications may relate to either, exclusive of the other. The aortic and pulmonary sounds may be separately increased or diminished in intensity; and each may be extinguished, the other remaining.

10. Extinction of the aortic sound, the pulmonary sound not being suppressed, denotes destruction or very serious injury of the aortic valves. This conclusion is corroborated by the presence of a murmur referable to the aortic orifice.

11. Abnormal weakness of the aortic sound denotes injury to the aortic valves, especially if an aortic murmur be present, provided that this weakness be not attributable to mitral contraction or regurgitation, or to impaired muscular power of the heart. The presence or absence of mitral disease may generally be determined by the presence or absence of a murmur referable to the mitral orifice; and to determine whether the weakened aortic sound be due to impaired muscular power of the heart, this sound may be compared with the pulmonary sound, which, in health, is feebler than the aortic. Evidence of enfeebled action of the heart is also obtained by observing the *first* sound. (*Vide* No. 5.) The *second* sound of the heart, however, is comparatively much less affected by the various conditions which involve impairment of the muscular power of the organ, than the *first* sound.

12. On the normal intensity of the aortic sound may be predicated an opinion that the aortic valves are sound. When this sound is found to retain its normal intensity, in connection with a diastolic murmur, the fact renders it probable that the murmur is produced by the direct current of blood through the mitral orifice, and not by aortic regurgitation. When the normal intensity of this sound continues, in connection with a systolic murmur referable to the aortic orifice, it shows that, although a lesion exists in this situation, it has not, as yet, led to serious change of the valves.

13. Exaggerated intensity of the aortic sound occurs in cases of hypertrophy affecting the left ventricle so long as the muscular power of the organ is not impaired. This alone, however, is not a sign of hypertrophy, for the sound is also exaggerated when, from any cause, the power of the heart is increased.

14. Abnormal modifications of the pulmonary sound relate, so far as their importance practically is concerned, to an increased intensity of this sound. When it is found to be relatively more intense than the aortic sound, it denotes either that it is positively exaggerated, or that the aortic sound is abnormally weakened, or both these conditions may exist. If the aortic sound be not abnor-

mally weakened, greater relative intensity of the pulmonary sound is evidence of hypertrophy of the right ventricle. In connection with this exaggeration, the tricuspid portion of the valvular element of the first sound will be likely to be intensified. Whether a greater relative intensity of the pulmonary sound be due to a positive exaggeration, or to diminished intensity of the aortic sound, or to both combined, it is generally observed in cases of mitral disease attended by either obstruction or regurgitation. This rule, however, is not without exceptions.

PRIZE ESSAY.

VISION, AND SOME OF ITS ANOMALIES,

AS REVEALED BY

THE OPHTHALMOSCOPE.

BY

MONTROSE A. PALLEN, M.D.,

OF ST. LOUIS, MISSOURI.

Dux hominum medicus est.

PRIZE ESSAY.

VISION, AND SOME OF ITS ANOMALIES, AS REVEALED BY THE OPHTHALMOSCOPE.

THE following essay purports to consider two subjects, which are intimately connected: viz., the anatomy and physiology of the parts concerned in vision, and some of the derangements attending it. For the purpose of better illustrating these latter, the late discoveries effected by the ophthalmoscope will be entertained.

That branch of science which treats of the nature and laws of vision, is called optics, and is generally considered in three points of view, viz:—

A. *Perspective Vision*, which treats of the apparent size of objects, from the theory of the laws of the straight lined motion of light.

B. *Catoptric Vision*, which embodies the laws of the reflection of light, embracing always the principle, that the angle of incidence is equal to that of reflection.

C. *Dioptric Vision*, signifying the power of seeing through transparent media, involving the laws of refraction, which embraces the principle of the bending of light as it passes from a rarer to a denser medium, or *vice versâ*.

The two former have so slight a connection with our task, that it is needless to discuss the formulæ involving their demonstration. But as the third division enters very materially into the explanation of the *modus operandi* of vision, it is deemed advisable to enter into its discussion, when, further on, the subject will be brought up in its proper place.

The eye is the most complete of all optical apparatus, and, although it is perfected in man, he is not the sole possessor of

this "window of the soul," for many of the lower animals, the invertebrata as well as the vertebrata, are endowed with the sense of vision.

As we propose to take a rapid and cursory glance of the optical apparatus of the invertebrates, it may not be amiss or foreign to the subject, to sketch the various groups of the invertebrates, with regard to the structure of the visual apparatus. The vertebrate mammals are represented by man, whose eye will be more fully described, both as regards its anatomy and its physiology.

Before entering into any details concerning the invertebrata, we will give Siebold and Stannius'[1]

CLASSIFICATION OF THE INVERTEBRATE ANIMALS.

The invertebrate animals are organized after various types, the limits of which are not always clearly defined. There is, therefore, a greater number of classes among them than among the vertebrates. But, as the details of their organization are but yet imperfectly known, they have not been classified in a natural manner.

There are among them many intermediate forms, which make it difficult to decide upon the exact limits of various groups. The following division, however, from the lowest to the highest forms of organization, appears at present the best.

ANIMALIA INVERTEBRATA.

INVERTEBRATE ANIMALS.

Brain, spinal cord, and vertebrate column, absent.

First Group.—PROTOZOA.

Animals in which the different systems of organs are not distinctly separated, and whose irregular form and simple organization are reducible to the type of a cell.

Class I. *Infusoria.*
" II. *Rhizopoda.*

Second Group.—ZOOPHYTA.

Animals of regular form, and whose organs are arranged in a ray-like manner around a centre, or a longitudinal axis; the cen-

[1] Anatomy of the Invertebrata, by C. Th. v. Siebold. Translated from the German by Waldo I. Burnett, M. D.

tral masses of the nervous system forming a ring, which encircles the œsophagus.

Class III. *Polypi.*
" IV. *Acalephæ.*
" V. *Echinodermata.*

Third Group.—VERMES.

Animals with an elongated symmetrical body, and whose organs are arranged along a longitudinal axis; so that right and left, dorsal and ventral aspects may be indicated. The central nervous mass consists of a cervical ganglion, with or without a chain of abdominal ganglia.

Class VI. *Helminthes.*
" VII. *Turbellarii.*
" VIII. *Rotatorii.*
" IX. *Annulati.*

Fourth Group.—MOLLUSCA.

Animals of varied form, and whose bodies are surrounded by a fleshy mantle. The central nervous mass consists of ganglia, some of which surround the œsophagus, and others, connected by nervous filaments, are scattered through the body.

Class X. *Acephala.*
" XI. *Cephalophora.*
" XII. *Cephalopoda.*

Fifth Group.—ARTHROPODA.

Animals having a perfectly symmetrical form and articulated organ of locomotion. The central masses of the nervous system of a ring of ganglia surrounding the œsophagus, from which proceeds a chain of abdominal ganglia.

Class XIII. *Crustacea.*
" XIV. *Arachnida.*
" XV. *Insecta.*

Having premised the above classification, we propose to enter upon the visional apparatus of the Invertebrata, and will begin with the *Protozoa.*

Most of the *Infusoria* and *Rhizopoda* have simple red pigment spots, capable only of distinguishing light from darkness, and

which, without a special optical apparatus, accomplish the object by the whole surface of the body. Ehrenberg[1] presumed the pigment spot to be an eye, but it has no connection with a nervous spot or expansion, and contains no refractive media.

Of the second group (the *Zoophytes*), but few of the *Polypi* have organs of vision: their sensibility to light is perceived by the whole body. The *Syncoryne* and *Coryne*[2] have four red organs corresponding to ocular globes; and, the organ seen at the base of the six arms of the *Eleutheria dichotoma*, contains refractive media, viz., the cornea, crystalline lens, and aqueous humor.

Of the *Acalephæ*, the *Cteniphora*[3] is the only order having an organ corresponding to the eye: the organ in question has been considered by many as also performing the functions of audition.

Of the *Echinodermata*[4] there are none which possess an eye.

Of the third group, or *Vermes*, the *Helminthes*[5] possess no eye: the *Turbellaria*[6] have on the anterior extremity a light refracting body, containing a cornea, which corresponds to an eye: the *Rotatorii*[7] have single or double eye-specks upon the neck, and sometimes upon the forehead: these specks are covered by a cornea, and are situated upon the cerebral ganglion, and also connected with it by nervous filaments. The *Annulati*[8] are without eye-specks. Among the *Acalephæ*, an order of the fourth group, organs of vision are very common, and occupy a large portion of the borders of the mantle, or are situated upon the external orifices of the longer or shorter mantle-tubes. These eyes contain a cornea, aqueous humor, sclerotica, greenish or bluish iris, and retina. Most of the *Cephalophora*[9] possess organs of vision, and are seldom more than two in number. These eyes contain a cornea, sclerotica, iris, choroid, retina, and optic nerve.

The *Cephalopoda*[10] have very highly developed eyes which are disproportionately large: they are quite similar to those of the vertebrata. These eyes are composed of a cornea, aqueous humor, iris,

[1] Abhand'l. d. Berliner Akad., 1831, p. 12; also, Die Infusionthierchen, p. 491.
[2] Dumortier, Mém. sur. l'Anat. et la Physiol. d. Polypiers, p. 41.
[3] Milne-Edwards, Annal. d. Sc. Nat., pp. 206, 211.
[4] Valentin, Monograph. Zoophyta, p. 198.
[5] Müller, Zool. Danica., tab. LVIII. figs. 16, 17.
[6] Siebold, Anat. of Invertebrat., loc. cit., p. 135.
[7] Ehrenberg, loc. cit., and Siebold, loc. cit., p. 145.
[8] Cuvier, Mém. sur les Thalides, p. 12.
[9] Swammerdamm, Bibel der Nat., p. 47, tab. IV. figs. 5, 8.
[10] Mayer, Analekt, f. vergleich. Anat. Hft. i. p. 52.

crystalline lens, vitreous body, choroid, retina and optic nerve. Among those of the fifth group, or the *Anthropodia*, the Crustacea[1] most generally possess eyes, which exist in various grades of development. One form of these eyes, which is the lowest order, is known as *Simple;* they are composed of a cornea anterior to a refracting lens, surrounded by a layer of brown, blue, red or black pigment; at the most convex point of the lens, the optic nerve penetrates. Another form of these eyes is the *Compound Unfaceted*,[2] which consist of numerous eyes covered by a common cornea. Still another form is the *Compound Faceted*,[3] which is composed of very numerous tetragonal or hexagonal facets, behind each of which is a conical or prismatic lens, fitted in the vitreous body, and connected with a filament of the optic nerve. The Arachnoidæ[4] always possess simple eyes (stemmata), which are analogous to the simple eyes of the crustacea. They are formed of a cornea, lens and vitreous body surrounded by a retina, which is enveloped by a pigmentary membrane corresponding to the choroid. The Insecta[5] possess simple and compound eyes. The simple eyes (Ocelli, Stemmata) are composed of a cornea, either convex, elliptical, or spheroidal, a spherical or cylindrical lens, a pigmentary membrane corresponding to the choroid, and an optic nerve. These simple eyes are sometimes situated so contiguous to the brain, that the optic nerve is but a mere scale. The compound eye[6] is composed of single eyes whose corneæ are quadrangular or hexagonal, all of which are covered by one common faceted cornea. Behind each cornea, instead of a lens, there is a transparent pyramid whose apex is directed inwards, and received into a cup-shaped body corresponding to the vitreous humor, which is again enveloped by an expansion of the optic nerve, constituting the retina. Each pyramidal lens is enveloped by its own choroid.

As regards the differences in the Anatomy of the eyes of Vertebrate mammals, their general forms are so slightly varied from that of man, that a mere glance at some of the peculiarities will suffice.

[1] Müller, Zur vergleich. Physiol. d. Gesichtsinnes, p. 307.

[2] Tiedemann, Zeitsch. f. Physiol., p. 97.

[3] Milne-Edwards, Hist. Crust., t. i. p. 117.

[4] Latreille, Règne animale, iv. p. 207, 1829.

[5] Marcel de Serres, Mém. sur les Yeux comp. et les Yeux lisses d'Ins.

[6] Will, Beiträg. zur anat. d. zusammengesetzen augen mit facettirt, Hornhaut, 1840.

With carnivorous mammals, one of the most remarkable additions to the eye, is a strong retractor muscle, shaped like a hollow cone, with its apex attached to the bottom of the orbit, and with its marginal base inserted into the sclerotic, which it embraces, being under the recti muscles. Its use is to draw the eye within the orbit, giving it a very peculiar expression of hollowness, observed in the carnivora when enraged.

With birds and fishes there exist some peculiarities which we will cursorily notice. Fish are unprovided with eyelids; and, there is but little independent motion of the ball. Near the optic nerve between the layers of the choroid, is a gelatinous red structure, denominated the *choroid gland*, the use of which is unknown. Fish most generally are devoid of ciliary processes and bodies; but there is a rudimentary structure very similar to the ciliary bodies and corresponding to the pecten of birds.

With regard to birds, a sketch of the optic apparatus of the common owl (*strix bubo*) will explain the pecten, and the curious mechanism of the third eyelid, or *membrana nictitans*. The general shape of the eye is that of a bell, which arises from the disposition of a series of quadrangular osseous plates, convex on their inner aspect, which overlap, and are accurately fitted to each other. The firmness and rigidity thus communicated to the exterior casing containing the refractive media, prevent their pressure throwing the eye into a globular form. The ciliary body extends over the whole of this portion of the surface. The pecten is a curious quadrangular fold of the choroid, which projects into the vitreous body (in some birds it is attached to the lens), and is rather short and folded upon itself, very similar to a lady's fan. Its use is as yet a mooted question. The yellow spot of Sœmmering in the human retina is a rudiment of the pecten.

At the back of the globe, two muscles, originating from the sclerotica, are curved superiorly and inferiorly around the optic nerve. The superior and larger, the *Quadratus*, is attached near the margin of the sclerotic, its fibres converging to a narrow tendon, perforated through its whole length like the hem of an apron. The inferior and smaller muscle, from its shape called the *Pyramidalis*, is inserted in an opposite part of the circumference; its fibres converge and are attached to a long round tendon, which passes through the *hem* or loops of the Quadratus, thence turning over the edge of the broad part of the sclerotic, is continued over the bell-shaped surface, where it passes through several filiform loops

or pulleys, which keep it applied to the concavity, and around a bony projection from the surface.

It is attached near the cornea, to the membrana nictitans, an elastic fold of the conjunctiva, which constitutes the third or winking eyelid. From the *modus operandi* of these muscles, the sweeping action of the membrane is readily understood, as it is moved with incredible rapidity over the ball, and as rapidly rebounds owing to the elasticity of its structure. The membrane is of a milky hue, and has for an object the cleansing of the ball from hypersecretions and foreign substances. The haw of quadrupeds is the analogue of the membrana nictitans; this *haw* is frequently forced out of the orbit toward the inner canthus, by the pressure of the globe upon it, as it is unprovided with muscles. In the human eye there is a rudimentary winking membrane, which is a small crescentic fold of conjunctiva situated at the inner canthus behind the lachrymal caruncle.

Having thus cursorily glanced at the Invertebrata, as well as a few of the Vertebrata, with regard to the optical apparatus, we will, according to the proposed plan, sketch the Anatomy of Vision as it is typified in Man, the highest of mammals, by remarking the details of structure of the ocular globe proper.

The eye, as seen in man, is composed of four distinct parts.

I. The wall or tunics, constituting the protective parts.
II. The adjunct portions for its perfection as an optical instrument.
III. The dioptric apparatus or refractive media.
IV. The visional or specially sensitive parts. The protective parts of the apparatus are the Sclerotic and the Cornea.

The sclerotic is a strong, fibrous, dense and white membrane, thicker posteriorly than anteriorly, where it presents the appearance of a truncated sphere of one-fifth, and has a bevelled edge for the reception of the cornea in a manner very similar to the fitting of a watch crystal in its case. Posteriorly, and a little to the internal side of the axis of the ball, it is perforated by the optic nerve. No nerves have as yet been traced into its substance, although many, together with bloodvessels, pass through it. The outer surface is rough and firm for the attachment of muscles, but everywhere else is perfectly smooth; the inner surface is of a light brown color, and roughened from the presence of the *membrana fusca*, a delicate areolar membrane through which branches of the ciliary

nerves and vessels pass in an oblique manner. The texture of the sclerotic is similar to that of tendon, viz., of longitudinal and transverse fibres interlaced at right angles with each other. The cornea, which is one of the dioptric media as well as a protective part of the eye, is circular, occupying the anterior fifth of the eye, and resembling the segment of a smaller sphere adapted to a larger one. Its anterior border surface is convex, and its posterior one concave. The cornea has properly but one layer; all others mentioned by anatomists, being produced by boiling water and other re-agents acting upon its chondrin. Bloodvessels do not exist in the cornea proper, its nutrition being carried on by endosmosis and exosmosis; its structure is of stratified bundles of fibres, analogous to those of the areolar tissue, and between which, there exists an amorphous, solid, and transparent matter. Anterior to the cornea is the conjunctiva, erroneously presumed by some to be the first layer of the cornea; it consists simply of stratified tessellated epithelium, and is continuous with the conjunctiva scleroticæ, and wants only its cellulo-vascular basis. Behind the cornea is a very solid amorphous membrane, covered by a pavement epithelium which is called the membrane of Demours or Descemet, a continuation of which is carried over the iris. Schlemm has traced branches from the ciliary nerves into this membrane.

The adjunct parts for the perfection of the eye, as an optical instrument, are: the Iris, which serves as a diaphragm, to prevent the passage of too much light, and to correct the aberration of sphericity; the Pigment, which serves for the absorption of light, and the Choroid, which is but a continuation backwards of the iris.

The Iris is a disk or circular membrane placed behind the cornea, and anterior to the crystalline lens, dividing what are called the chambers of the eye into two unequal portions, the *anterior* being larger than the *posterior*. The pupil is a circular opening or perforation, situated rather to the inner and upper part of the iris; it presents a free border, known as the *pupillary margin*. The anterior face of the iris, carpeted by the same epithelium as that of the membrane of Descemet, presents a number of radiating fibres, of a streaked whitish tendinous character; they diverge from or converge to the pupil at about $\frac{1}{30}$ of an English inch from the pupillary margin, constituting what is known as the *larger* or *outer* ring, between which, however, and the pupillary margin they are concentrically arranged, constituting the *smaller* or *inner* ring. The fibres of the rings are non-striated muscular, and by their contrac-

tion produce the changes in the size of the pupil; the outer ones contracting producing *dilatation*, whereas the inner ones doing likewise, produce *contraction*. The posterior border of the iris is covered by the *uvea*, or an aggregation of pigment granules with nuclei and without cell-walls. This side of the iris, unlike the anterior, wants epithelium, and is continuous with the choroid, by the *annulus albidus* or *ciliary ligament*, or more properly the *tensor* or *circular muscle* of the choroid, which has been proven by Brüke to be of the non-striated class of muscles; but of this when we speak of the choroid. The iris is very abundantly supplied with bloodvessels and nerves. The arteries are the long posterior ciliaries, branches from the short posterior ciliaries, ramifying in the ciliary processes, and branches from the anterior ciliaries. There are veins which run parallel or correspond to the posterior ciliaries (arteries), whilst the veins corresponding to the anterior ciliaries, communicate with the *sinus circularis iridis*, or canal of Fontana, which is lodged in a groove parallel to the junction of the inner surface of the sclerotica with the cornea, where the ciliary ligament is inserted, and is of sufficient size to permit the passage of a hair within its calibre. The different bloodvessels form a very free anastomosis at the circumference of the iris, whence branches proceed to the pupillary margin, near which another finer vascular network is formed, whence capillary loops go to the pupillary margin. The long posterior ciliaries enter the sclerotic at a greater distance from the optic nerve than do the short ones, and then proceed in a line corresponding to the equator of the eye, upon the outer surface of the choroid, on the nasal and temporal sides, where about $\frac{1}{4}$ of an inch from the ciliary processes of the iris upon the temporal side, less upon the nasal, they divide at a very acute angle into the upper and lower branches. They all inosculate in the *annulus albidus*, whence their ramifications extend to the above described, first vascular circle. The ciliary nerves or nerves of the iris, from twelve to fifteen in number, arise from the nasal branch of the fifth pair, and especially the anterior portion of the ophthalmic ganglion, unite into two bundles, pierce the sclerotic near the entrance of the optic nerve, and pass forward on the outside of the choroid, to be distributed to the tensor muscle of the choroid, or annulus albidus, whence they ramify in the muscular fibres of the iris. The fibrillæ of the ciliary nerves, which preside over the *circular muscle* of the iris, arise from the third nerve, whilst those governing the radiating muscle, come from the spinal and the sympathetic of the neck.

The functions of the iris are to measure the quantity of luminous rays necessary to vision: for in a glare of light the pupil is contracted, and in obscurity it is dilated; undoubtedly showing that these functions are governed by the reflex-motor and automatic system of nerves. The iris also serves to correct the aberration of sphericity. The color of the iris depends upon pigment cells deposited in front and behind the membrane, and the presence of pigment deposits within its substance. The *uvea* is a quantity of pigment contained under a thin transparent membrane covering the posterior face of the iris; and, as its quantity is increased so is the tint deepened. The pigment cells of the iris as well as of the choroid are for the most part polyhedral in figure, generally hexagonal, and joined together like Mosaic work; others are spheroidal, particularly those of the uvea: in Albinos they contain no colored granules. The contents of these cells are minute brown or black granules, either spheroidal or elliptical, measuring in their greatest diameter from $\frac{1}{1700}$ to $\frac{1}{2400}$ of an inch, and after having escaped from the cell-membrane, they exhibit a peculiar molecular movement. Chemically this black or brown matter is insoluble either in hot or cold water, alcohol, acetic or diluted mineral acids, fixed or volatile oils. Oxide of iron, chloride of sodium, lime and its phosphates are obtainable from its ashes.

The function of the pigment is evidently and obviously intended to absorb redundant light, hence Albinos bear but indifferently well the superabundance of light, and see better at night than during the daytime.

The choroid is a very delicate membrane which carpets the posterior portion of the eye, and lies between the sclerotic and retina. Penetrated posteriorly by the optic nerve it extends thence to the *tensor muscle* or *annulus albidus*, and to the anterior portion of the hyaloid membrane, where it becomes plicated or thrown into folds around the margin of the crystalline lens. It is composed of a multitude of very small arterial and venous ramifications, connected by very fine areolar tissue, cells, lamellæ, and pigment granules. It is connected outwardly with the sclerotic by a thin areolar tissue interspersed with irregular shaped pigment cells, called the *arachnoidea oculi* or *lamina fusca*, and inwardly to the *membrana Jacobi retinæ*. The arteries come from the short ciliaries of the ophthalmic, piercing the sclerotic near the optic nerve, and are some twenty or thirty in number, which divide into branches parallel to the equator of the eye: they communicate and anastomose very freely, forming

a network on the concavity of the venous layer, constituting what is known as the *tunica Ruyschiana*. The veins, from their whirl-like arrangement, are called *vasa-vorticosa*, and converge to four nearly equidistant trunks, which empty into the ophthalmic vein, midway between the cornea and the optic nerve. The posterior ciliary veins pass out from the eye parallel to the entrance of the arteries. The pigment has been described above. The *annulus albidus*, or connection between the iris and choroid, is a flat, narrow band of a grayish substance, situated at the anterior end of the choroid, and serves to hold the retina and choroid around the vitreous body. According to Brücke it is formed of non-striated muscular fibres, converging from before backwards, and of circular fibres on a level with the union of the cornea to the sclerotic; the iris attaches itself to it by its greater circumference, a little behind the union of the cornea and sclerotic, upon a circular line which traces the separation between the anterior portions of the ciliary processes, and the internal face of the ciliary muscle or ligament: Graefe, of Berlin, has latterly discovered that some fibres bend forward to again cover the internal face of the ciliary ligament. Thus, whilst the areolar portions of the choroid appear to blend with the annulus albidus, its vascular portions, with large quantities of pigment, turn inwardly, posteriorly to the iris, anteriorly to the vitreous body, and as they approach the crystalline lens, are thrown into radiated folds called the ciliary processes, of which there are seventy in number, the whole of which is denominated the ciliary body, and is subdivided into a *pars plicata*, and a *pars non-plicata*.

The *dioptric apparatus*, or refractive media, consist of the cornea above described, the aqueous humor, the crystalline lens and capsule, and the vitreous body.

The aqueous humor is found in the anterior portion of the eye, immediately behind the membrane of Descemet, and anterior to the crystalline and folded ends of the ciliary processes: the iris divides it into two unequal compartments or chambers, viz: the anterior and posterior, which in the fœtus are completely unconnected by an occlusion of the pupil, by the *membrana pupillaris*. In extra fœtal life they are connected by means of the pupil; and, of the two chambers, the anterior is the larger. This fluid is composed of a small quantity of albumen, and of the various salts met with in the economy, particularly the chloride of sodium held in solution. It is secreted or formed from a membrane covering the posterior

wall of the iris and the anterior folds of the ciliary processes. The aqueous humor, when examined under the microscope, is found to contain only a few colorless cells; its form is somewhat of a meniscus, and measures at its greatest antero-posterior diameter about $\frac{1}{11}$ of an English inch. Its functions are those of refraction, which, in conjunction with the ellipsoidal cornea, the lens, and the vitreous body, serve to bring the light to a focus upon the retina.

The *crystalline lens* is a double convex or lenticular body, placed between the aqueous humor and the vitreous body, at the reunion of the anterior third, with the two posterior thirds of the ocular globe. Its diameter is nine millimetres ($\frac{7}{20}$ of an inch), and its thickness, corresponding to the axis of vision, is about half as much, five millimetres. The axis does not lie exactly in the centre of the eye, but slightly to the internal side, parallel with, or corresponding to the centre of the pupil and the axis of vision. The lens is more convex posteriorly than anteriorly; and its convexity is in an inverse ratio to the convexity of the cornea and the quantity of the aqueous humor. In density, degree of diaphanousness, color, and form, the crystalline lens presents marked changes in the different stages of life. Thus, in the fœtus it is reddish in color, not perfectly diaphanous, easily broken down, and is spherical, whereas in adult life it is perfectly transparent, the posterior surface becomes more convex, and the substance is firmer and colorless; and, in old age, it assumes a slightly yellowish or amber colored tint (sometimes so insensibly increased as to terminate in a loss of transparency or cataract); it becomes flattened, and gradually increases in specific gravity and firmness. By its external margin it is in immediate contact with a membranous sac, the *capsule*, the character of which is quite different on its anterior and posterior margins. The anterior border is free, whilst the posterior is lodged in a depression in the vitreous humor, and is much thinner than the anterior one; the whole sac is an amorphous, homogeneous transparent substance, brittle and breaking like glass, and carpeted on its inner layer by epithelial cells, with very fine granular spherical or oval nuclei. The tissue of the crystalline is composed of two sets of fibres, very regularly disposed above and by the side of each other, forming two distinct layers. The superficial ones are composed of nucleated fibres, forming a layer from $\frac{3}{10}$ to $\frac{4}{10}$ of a millimetre in thickness upon the surface, and are disposed parallel to each other of a size from $\frac{7}{1000}$ to $\frac{9}{1000}$ of a millimetre, flattened,

with clear edges, and finely granulous within the interior, with spherical or oval nuclei of $\frac{6}{1000}$ of a millimetre in diameter. The other fibres are called *dentelated*, and are firmer, narrower, smaller, paler, and more transparent than the former, and without any granulations in the interior, with notched borders, whence the name. The aggregate of the above described fibres form concentrated layers, easily separated when immersed in alcohol, and which are as a whole segmentated. The fibres pursue an antero-posterior direction; and it is remarkable that they do not converge to points on the anterior and posterior margins, but form radiating clefts like an orange. After death, when the capsule is punctured, there flows a peculiar liquor, which, according to the best authorities, is altogether a *post-mortem* production, and is known as the *liquor Morgagni.*

The canal of Petit is the name given to the space found between the ciliary and vitreous bodies, and which comprises the whole circumference of the lens; this canal does not in reality exist, but is made artificially, by the separation of the areolar tissue holding the parts together; this separation is made by the injection of air, which forms lead-like projections, united by bundles of tissue. Some authors suppose the canal of Petit to be a separation into two layers of the hyaloid, one going to the posterior border of the capsule of the lens, adhering to it and lining the *fossa hyaloidea*, and the other forming the ciliary zone, or *zonula* of *Zinn* (to be described), which is inserted into the circumference of the lens.

What is known as the *zonula* of *Zinn*, or ciliary zone, is the hyaloid membrane for the breadth of about $\frac{1}{8}$ of an inch, raised up into radiating folds, of a similar structure to the ciliary processes, into which it digitates and dovetails.

The vitreous body or humor lies in the middle and posterior parts of the eye, behind the crystalline lens, concentric with, parallel to, and within the retina. It is composed of a transparent semi-solid gelatinous substance, without either nerves or blood-vessels. It presents anteriorly a concavity, called the *fossa hyaloidea*, into which the larger or posterior segment of the lens is lodged; posteriorly it presents a convexity corresponding to the concavity of the retina. According to all anatomists, with the exception of some of the modern microscopical school, particularly M. Charles Robin, the vitreous humor is surrounded by a membrane of *enveloppe*, called the *hyaloid;* but, according to M. Robin, it is

surrounded posteriorly and laterally simply by the retina, and anteriorly by the posterior margin of the capsule of the lens, together with the ciliary processes in front.

But, according to others, the vitreous humor is contained in a segmentary membrane, which (according to Hannover) may be discovered "by a careful maceration in chromic acid, to consist of about one hundred and eighty delicate septa like the pulp of an orange," with the angles of the inclosed spaces in the direction of the axis of the eyeball, which do not meet, but leave a cylindrical portion for the passage of a branch of the *arteria centralis retinæ*, called the *arteria hyaloidea*, and the canal through which it passes is called the hyaloid canal of Cloquet. In the fœtus there is a vein corresponding to the artery, which conducts the blood from the posterior part of the capsule. Robin considers this canal to be not in existence, that there is no reflexion of the membrane, and that the artery having no investing membrane penetrates the substance proper. He also maintains that the vitreous humor is a special organic substance, entirely amorphous, not even fibroid; the fluid of which slowly drains away, when separated from the eye, leaving behind an amorphous and heterogeneous matter. Bowman has confirmed Hannover's experiments only in the fœtus. Kölliker thinks that it is an analogous condition to the embryonic areolar tissue, which after fœtal life completely disappears, and becomes a kind of more or less consistent mucus. The function of the vitreous body is the correction of prismatic refraction.

The visional or specially sensitive parts are the retina and the optic nerve.

The retina is the most internal of the tunics of the eye; it entirely embraces the vitreous body, and is situated between it and the choroid. Anteriorly it is limited by the *ora serrata retinæ*, where it is somewhat thickened, and appears to end in a defined margin. Robin, Bidder, and Valentin contend that it is continued over the inner surfaces of the ciliary processes, and connected to the hyaloid. Posteriorly it is connected with the *papilla conica* or *colliculus* of the optic nerve, which apparently it seems to constrict. Two lines exterior to the papilla, and in the centre of the visual axis, is found the *macula flava seu lutea centralis:* this, the yellow spot of Sœmmering (who first described it in 1791), is composed of a depression and a border. Sœmmering thought this colorless depression to be a canal, and hence named it *foramen retinæ centrales*, but wrongly, as

there exists only the above-mentioned depression: the border or ring alone is colored, and is called the *limbus luteus foraminis centralis.* Continuous with the limbus and extending towards the papilla, the retina is thrown into a fold, which is known as the *plica centralis retinæ.*

The retina, in the living subject, is normally transparent, but becomes opaque, of a grayish white color, upon decomposition, or subjection to alcohol or nitric acid. Formerly, the retina was supposed to consist of only three layers, viz: the *membrane of Jacob, the medullary, and the vascular layers.* The latest researches, however, indicate five different sorts of substances, arranged in successive strata.

I.	The layer	of	columnar bodies	or	*stratum bacillorum.*
II.	"	"	" myelocytes	"	*stratum granulosum.*
III.	"	"	" corpuscles	"	*stratum gangliosum.*
IV.	"	"	" nerve-tubes	"	*stratum fibrillosum*
V.	"	"	" amorphous substance	or	*membrana limitans.*

The *stratum bacillorum* is formed of small cylindrical bodies, arranged side by side, and vertically to the retina; they consist of a peculiarly clear substance, from the $\frac{4}{100}$ to $\frac{6}{100}$ of a millimetre in thickness. Two kinds of bodies can readily be distinguished in this stratum: the cylinders or columns proper (*batonnet*, French, *stäbschen*, Germ.), which are transparent, flexible, and of a length varying from the $\frac{2}{100}$ to the $\frac{3}{100}$ of a millimetre; they are either *single or geminated* (twin-like), that is to say, curved in the manner of a horseshoe, with their free extremities on the same level; and *fusiform* (*cônes*, French, *zapfen*, Germ.), which are about the size and form of small cylindrical epithelial cells; they are slightly enlarged in the middle, finely granulous, and have delicate filamentous prolongations similar to the cylinder proper.

The layer of myelocytes, or *stratum granulosum*, is composed of numberless nucleated, small, and regular cells, which are scattered about in an amorphous substance, very much like the gray matter of the brain. This gray matter is most abundant in the anterior portion of the second layer, which is the thickest of the whole of the five strata.

The layer of corpuscles, or *stratum gangliosum*, is composed of ganglionic corpuscles, which send off filamentous prolongations, or cylinder axes, to the layer of myelocytes, and cylinders proper, to the continuation of some of the tubes of the optic nerve.

The layer of nerve-tubes, or *stratum fibrillosum*, is the spreading out of the optic nerve. The optic nerve at first sends out very delicate radiating fibrillæ, interlacing with various plexuses, with elongated meshes, which continually diverge, and the spaces between them constantly undergo an increase. With regard to the termination of this stratum, anatomists disagree. Valentin says that they end in loops upon the anterior margin of the retina. Hannover contends that they end by free extremities. Robin, who seems to have investigated this matter more thoroughly than any one else, says that they do not reach the anterior margin or fringed border, but terminate upon the whole surface of the retina, most probably in the ganglionic corpuscles. Some of them go directly to the yellow spot of Sœmmering, and terminate at its periphery, where they surround it, forming two bundles or two quite large rolls, and which, in all probability, form the *plica* or folds there visible. The depression in the yellow spot is owing to the absence of this layer: all of the other strata being there found. This layer is composed altogether of gray matter, and, what was latterly demonstrated by Todd and Bowman, was long ago suspected: viz., that none of the white substance of Schwann enters into the composition of the retina.

Fifthly, there is found in the retina an amorphous substance, known as the *membrana limitans*, which is parallel and anterior to the *stratum fibrillosum*, and passes in front of the ciliary processes to the capsule of the crystalline lens, where it terminates in a circle. This is the only layer of the retina which is vascular, the central artery and vein ramifying throughout its extent. According to H. Müller, various fibres are detached from this membrane (fibres of Müller), to pass through the thickness of the other layers into the cylinders proper of the *stratum bacillorum*.

The *optic*, or second cranial nerve, is one of special sense, and is entirely distributed to the eye. It springs from the superficial layer of the optic tract, which arises from the *thalamus opticus*, *corpora quadrigemina*, and *corpora geniculata*. Leaving the under part of the thalamus, it makes a sudden bend forwards, and strikes obliquely across the inferior surface of the cerebral peduncle, assuming a flat ribbon-like appearance. Before reaching the *sella turcica*, it assumes a more rounded form, where it decussates with its fellow, forming the *chiasma* or commissure, previously, however, having received an accession of fibres from the *lamina cinerea*, and having

an adherence to the *tuber cinereum*. "The fibres of origin of the optic tract from the thalamus are derived partly from the superficial stratum, and partly from the interior of that body. According to Foville, this tract is also connected with the *tænia semi-circularis*, and with the termination of the *gyrus fornicatus;* and he states, further, that where the optic tract turns round the back of the thalamus and the cerebral peduncle, it receives other delicate fibres, which descend from the gray of those parts." (Mayo, *Outlines of Anatomy*, p. 514.) The nerve, after leaving the commissure, passes through the *foramen opticum* of the sphenoid bone, being previously invested with a sheath from the *dura mater*, and passes, surrounded by the recti muscles, to, and then through the sclerotic and choroid tunics at the back of the eyeball.

The nerve is composed of fasciculi of microscopical primitive fibrils, inclosed in a neurilemma, the whole being again incased in a larger neurilemma. As the nerve penetrates the sclerotic, the neurilemata of the fibres cease; hence the apparent constriction of the nerve at that place. About four lines from the sclerotic, the nerve is penetrated by a canal which transmits to and fro, the central artery and vein of the retina.

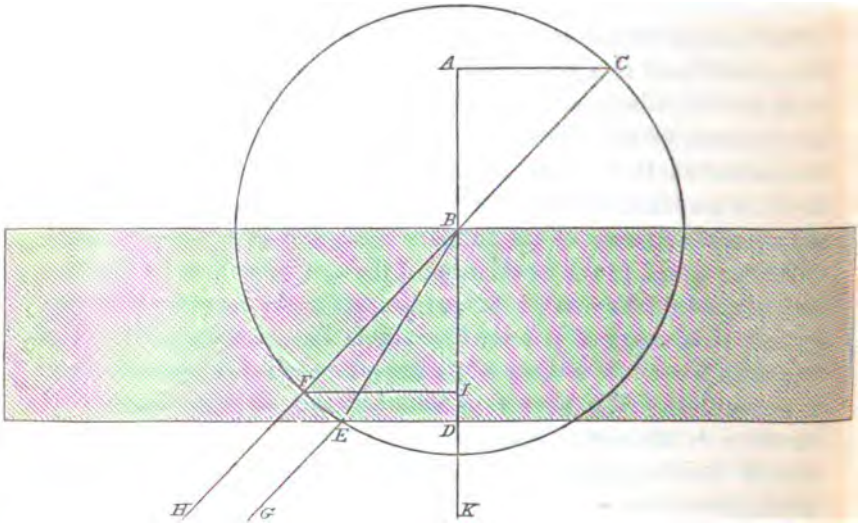
With regard to the circulation of the eye, as well as its development, it would be foreign to our present purpose, and also would extend this essay to a most formidable length, were we to enter into it in a manner worthy of its importance; hence we must leave it untouched. We have thus sketched, almost superficially, the anatomy of the eye. Why we have so done, is readily apparent; and its bearing upon the physiology of vision is at once comprehended.

According to the proposed plan, the physiology of vision will now be sketched.

Vision is a function of relative life, of which the eye is the apparatus, through which we perceive one of the qualities of physical bodies, denominated luminous. The perception of these luminous bodies is subject to the above mentioned laws of optics. Of these laws we propose to enter upon the demonstration of but one, viz: that of refraction. The facts that opaque bodies reflect light, and transparent bodies transmit it, are such as need no demonstration, and they are but secondary to our object; but, a ray of light entering in an oblique manner, from one medium to another, the direction is changed, or rather the ray is bent either to or from the perpendicular, which phenomenon constitutes refraction.

Thus, if a ray passes from *A* perpendicularly to the surface of the piece of glass at *B*, it will pass to *K* in the right line *A B I D K*. But if the same ray be directed to the surface *B* obliquely, as from *C*, instead of passing through in a direction *C B F H*, it will be refracted to *E*, in a direction approaching the perpendicular *A K*. The ray of incidence is *C G*, and the angle *C B A*, made with the perpendicular *A K*, is denominated the angle of incidence. The refracted ray is *B E*, and the angle *E B D* is the angle of refraction. The ray from *C* to *B*, and refracted to *E*, is as much bent from the line of the refracted ray *B E*, as it was from the line *C B F H*. Hence,

Fig. 1.



it follows that a ray passing through a transparent medium having two surfaces on parallel planes, is refracted from its original course, and in passing out is bent parallel to the original line. Now, if a circle be described about a centre *B*, with any radius as *B E*, the arc *D F* measures the angle of incidence *D B F*, and the arc *D E*, that of the angle of refraction *D B E*. A line *F I*, brought from the point *F*, perpendicular to *A B I D K* is the sine of the angle of incidence, and the line *D E* is the sine of the angle of refraction *E B D*. Hence, it follows that the sine of the angle of incidence has the same ratio to the sine of the angle of refraction, it matters not in what degree of obliquity the incident ray *C B* is thrown upon the transparent medium. Dr. Arnot draws, after en-

tering very minutely into the details of a very long mathematical calculation, the following conclusions from the above theorem. "If any ray of incidence passes from air obliquely into water, the sine of incidence is to that of refraction as 4 to 3; if it passes from air into glass, the proportion is as 2 to 3; and if from air into diamond it is as 5 to 2."

Having thus premised the phenomenon of refraction, its application to the study of vision is readily appreciated. The cognizance by the retina of an object, is the combined result of the impinging of rays of light upon the retina, and a sensation communicated to the brain by means of the optic nerve. These sensations are produced by colors and their refraction and reflection, all of which are subject to the laws of light: they cause us besides to perceive certain characteristics in a mathematical order, such as situation, form, and size, subject to judgment and comparison, which apply the phenomena of reflection and refraction produced by these bodies. Hence it is, that errors of judgment produce deceitful appearances, which errors are induced by, either the manner in which the light is reflected, or according to its intensity, or whether it strikes one or both eyes, or according to the conditions of the refractive media, their curvature, etc. etc. Were we dependent entirely upon judgment for the perception of bodies, we would frequently be deceived, but the sense of touch causes us specially to recognize the peculiarities to which vision is subjected.

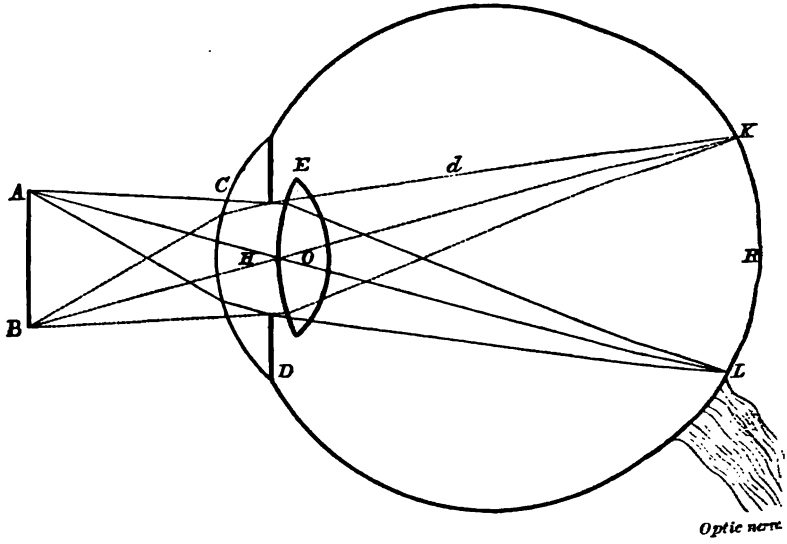
The phenomena of vision are, A, purely *physical*, beginning at the cornea and ceasing at the retina; and B, *organic* or specially sensitive, depending upon the properties of the nerve, which begin where the physical ones cease, and cease themselves in that portion of the brain which *perceives*.

Every object sends off a cone of luminous rays, which so long as they pass through a medium of the same density, proceed in straight lines; but when they enter a denser medium undergo the refraction above demonstrated. Whether, as Newton and Descartes maintained, light be a material substance emitted from luminous bodies, thence conveyed to the eye, thereby rendering them visible, or as Dr. Young considered it, to be undulations propagated through a fluid (the doctrine at present generally admitted), it matters not for our present purpose: its discussion rather belongs to the Secondary Mechanical Sciences, than to a brief essay upon vision. Whatever be the adopted theory, this light, before producing the desired effect, undergoes four successive refractions:—

I. From the air or object *A B* to the cornea, which refracts it in consequence of its density and convexity.

II. From the cornea *C*, to the aqueous humor *H*, which causes it to be bent slightly to the perpendicular.

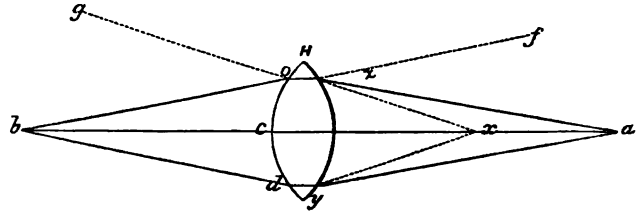
Fig. 2.



III. From the aqueous humor *H* to the denser and more convex crystalline lens *O*, where it undergoes a new refraction, following the general law.

IV. The last and chief refraction is from the denser medium the lens, to the rarer one the vitreous body. Thus, in the crystalline

Fig. 3.



lens, the ray *b o* is bent to the perpendicular *o g* prolonged, and passing through follows the direction *o z*, and in passing out approaches the line *b a;* but it passes to the rarer medium, the vitreous body (Fig. 2, *d*), by which it is again bent from the perpendicular.

Thus (Fig. 2), if from the assumed points *A B*, light be emitted, the image will be formed upon the retina, *R*, upon the points *K L*; the image thus produced is inverted, constituting one of the *paradoxes* of vision, of which hereafter. There are two circumstances which will prevent the perfection of the above mentioned image, were not the eye so perfectly adapted to its ends. Thus *Spherical Aberration* is corrected by the combination of the aqueous humor and the iris; the former from its refrangibility, the latter acting as a stop or diaphragm, in such a manner that only the central portion of the crystalline is used. *Chromatic Aberration* is corrected or remedied by the conjoint action of the crystalline and the vitreous body, the latter exercising the greater dispersive power, and also from its offering a concavity to the convexity of the lens. All of the refractive media conjoin to produce the image upon the retina, which is clear and precise if these media be correctly adapted, and if they be incorrectly placed, the image is indistinct and confused. The *adaptiveness* of the eye to distance, is one of the prerogatives of sight, and, as such, its mechanism is truly wonderful. The power by which it adapts itself to variations of distance, whether it be the small distance between the eye of the engraver and the steel, or the vast expanse of old ocean's mightiness, has as yet been unexplained, at least in a satisfactory manner. Whatever be the distance of an object from us, it is a matter of no immediate perception, but is a judgment and inference drawn from our sensations. The elements upon which our judgment is based, are, the effort by which the two eyes are fixed upon the same object, and that by which one or the other eye is adjusted to distinct vision; and, the colors, forms, and volume of objects, as compared with each other's appearance. The correct interpretation of the whole is gradually learnt by experience, the rapidity and unconsciousness of which process are not more remarkable than the acquirement of speech and the capability of reading. Having acquired the conception of the relation of position, or in other words, the ratiocinative faculty of vision, by what faculty then is this accomplished? Brown[1] denies *touch*, but *advocates muscular sense*, which is but another name, and is but the consciousness of an exertion of the various muscles by which we move our limbs; for our knowledge of the forms of bodies is acquired by the perception of the course of the fingers, following

[1] Brown, Lectures of the Philosophy of the Human Mind.

their surfaces. Sir Charles Bell[1] calls this *consciousness* of muscular action a "sixth sense," which Marshall Hall more fully developed in his various writings upon the reflex-motor actions of the nervous system. The conclusion at last, is, that by the modifications of touch, or by touch itself, the relation of position is readily comprehended, and that it is fundamentally and inseparably connected with our own actions in space. A doubt seems to have arisen as to the fact whether a person born blind, who previously by *touch* could distinguish mathematical figures, a cube and a sphere for instance, on suddenly obtaining vision, would be able by this sense to recognize them. Locke[2] denied the possibility of so doing, and with justice: he arrived at this conclusive point by reasoning, which has subsequently been proven by facts. Cheselden relates the case of a lad born blind, who at the age of twelve years, was, by an operation for artificial pupil, restored to sight. This boy saw everything flat as in a picture, simply receiving the impression upon the retina, without being able to refer it, and it was for a long time before he had the power of judging, by vision, of the real distances and forms of objects around him. He was incapable of distinguishing a dog from a cat, until he touched them. Carpenter[3] relates a similar instance, of a boy who preferred to find his way (after being restored to sight), through his father's house by *touch*, rather than by sight alone.

Among the new-born of the lower animals, the capacity for estimating distance results from some immediate power, and they manifest, at an early moment, that which takes man a long time to acquire. They perform automatically or instinctively, these actions in obedience to internal impulses, without even the perception of their adaptiveness on the part of the being who is their agent. All of these impressions are called into play, by the action of external objects, or by changes in the individual organism. Now, whatever be the refraction undergone by the rays emanating from a luminous body, the spot where the image is pictured upon the retina, is determined by the prolongation of a ray which represents the centre of a cone, whence an inverted image is the result, *vide* Fig. 2, the point B is represented upon the retina at K, and the point A, at L. The angle formed by two central rays, C and D,

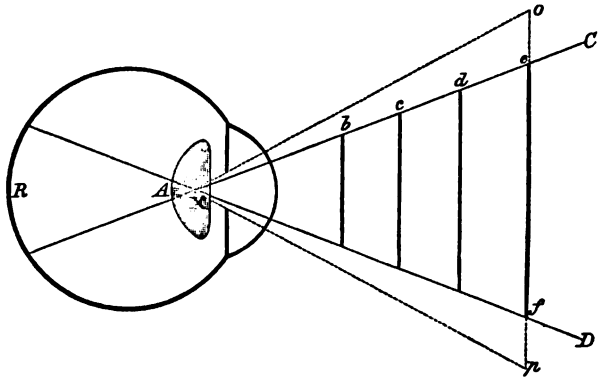
Bridgewater Treatise, p. 195. Phil. Transactions, 1826. Pl. II. p. 167.

[2] Locke, On the Human Understanding.

[3] Carpenter, Principles of Human Physiology, p. 676, Am. ed. edited by F. G. Smith, M. D., Philada.

Fig. 4, is known as the visual angle, and it follows as a consequence that objects situated at various distances from the eye, project images of equal size, provided they subtend the same angle. Hence the estimate of the *size* of an object is partly dependent upon the

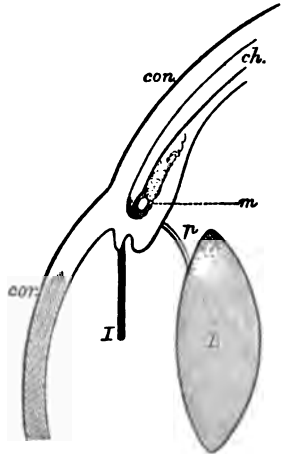
Fig. 4.



visual angle, and partly upon its distance, and the condition of the atmosphere. Thus if two objects, *o p*, *e f* (Fig. 4), the former twice the length of the latter, are placed at the same distance from the (*R*) retina, it is obvious that the angle *O X P* is twice the size of the angle *e x f*.

The faculty of the eye to accommodate itself to distances is physically owing to the displacement of the crystalline lens, through the action of the ciliary muscle (*tensor ciliaris*), and the erectile tissue of the ciliary processes. Although comparative anatomy would tend to prove this statement, yet in the human subject it has never been demonstrated by observation. Among the predaceous birds (the strix bubo (common owl) above mentioned), distinguished for great range of vision, there is a very firm attachment for the tensor ciliaris, in the osseous plates of the sclerotic. Another fact to go to prove this statement, is that

Fig. 5.

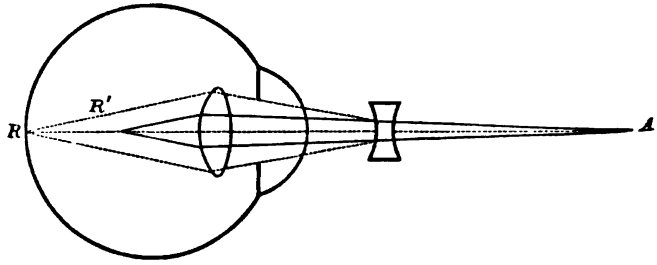


L, lens; *P*, junction with the assumed canal of Petit; *I*, iris; *cor*, cornea; *con*, conjunctiva; *ch*, choroid; *m*, the tensor ciliaris, showing a projection of the muscle and its connection with the lens.

with persons operated upon for cataract, there is an entire absence of the power of adapting the eye to distance.

Hence, this adaptiveness in the curvature of the refractive media, such as the cornea, aqueous humor, lens, and vitreous body. The most frequent conditions of abnormal vision are short-sightedness, *myopia*, and long-sightedness, *presbyopia*. Myopia is dependent

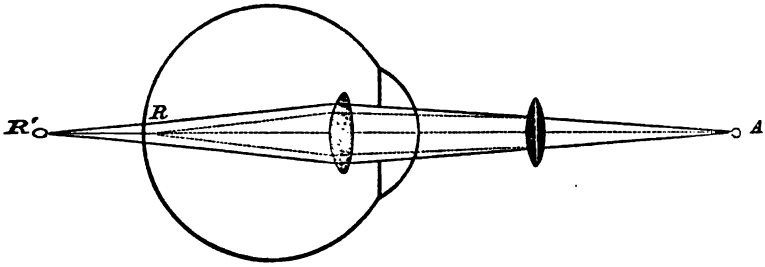
Fig. 6.



upon a condition of the refractive media, whereby the rays of light are so influenced that they converge so much as to unite before reaching the retina. The diagram illustrates this condition as well as its remedy by a concave glass, shown by the dotted lines reaching the retina. The physical causes which produce this condition of vision, are either an excess of density and a too great prominence of the cornea, or a superabundance of the humors of the eye, or a too great density or convexity of the crystalline, or an enlargement or dulness of the pupil, or a preternatural density of the vitreous body, or an over-activity of the power inherent in the eye, of adapting itself to the seeing of near objects, etc. etc. Were we to enter into the discussion of any of the above conditions necessary to the production of myopia, it would cause this essay to be of a too great length; hence, we must unwillingly pass over them, regretting our inability, at present, to inquire into this most interesting branch of optics.

Presbyopia is just the reverse of myopia, and is a confusion of vision, when near objects are looked at, while distant objects are distinctly seen. It is dependent upon a condition of the refractive media whereby the rays of light do not converge sufficiently soon, and hence do not reach the retina before coming to a focus. It is remedied (*vide* Fig. 7, dotted lines) by a convex lens, which produces the convergence necessary to throw the image upon the retina, by bringing the rays into a focus at that point.

Fig. 7.



The concomitant causes of this affection are generally, flatness of the cornea, shortening of the axis of the anterior chamber, diminution in the size of the pupil, and an apparent sinking of the globe within the eye. The same remarks made concerning the discussion of the causes of myopia, are equally applicable to those of presbyopia. . . . .

There are many other abnormities of vision, resulting from defective refractive media, which for a want of space cannot be described. Among them, however, there are two which we deem proper to notice, viz., astigmatism, and dyschromatopsia. Astigmatism (α privitive, and στιγμα, point) is a result of defective refraction in such a manner that the cornea and lens are so arranged, as to prevent the production of a focus, when the rays of light are presented in a vertical direction; and, when presented in a horizontal direction, a focus is produced. Thus, if a straight black line be drawn upon a piece of white paper, and viewed horizontally, nothing abnormal appears; but if presented vertically, it seems to be double. In the *Philosophical Transactions* for 1801, Dr. Young, in his article on the *Mechanism of the Eye*, mentions that his own eye, "in a state of relaxation, collects, to a focus on the retina, those rays which diverge vertically from an object at the distance of ten inches from the cornea, and the rays which diverge horizontally from an object at seven inches distance." What, then, is the explanation of the above phenomenon? It appears to us to have been caused by the light falling upon the whole surface of the pupil, and not brought to one corresponding point, or focal spot within the eye, thereby producing two linear images at right angles to each other. And it is probable that in all *astigmatics*, the cornea is without the "surface of revolution," and that its curvature is less in the horizontal than in the vertical plane; that the lens has one or both surfaces cylindrical, and varies in symmetry

and density. In the case of Dr. Young, he considered himself to be affected with an "obliquity of the cornea and crystalline lens with respect to the visual axis."

Gerson[1] relates the case of Prof. Fischer, of Berlin, who observed that, if a number of parallel lines were placed before him in a horizontal direction, he could distinctly count them at the distance of from fifteen to twenty inches, and when changed to a vertical position, they presented a confused appearance, until brought within five or six inches of the eye. Also, when Prof. F. looked at the bars of a window, in an upright position, the cross bars appeared longer than normally, and when he hung his head upon his shoulder, the upright bar assumed an elongated appearance.

The most remarkable instance of the defect occurred in the no less celebrated personage than the distinguished Mr. Airy,[2] the Astronomer Royal of Great Britain. The publication of this case led to the investigation of the subject, and the defect has been found not to be so uncommon as previously supposed. Dr. Hays,[3] of Philadelphia, details an account of a clergyman of that city, astigmatic in both eyes. Dr. Goode[4] relates his own case. Dr. Hamilton[5] describes a case of double astigmatism. The writer of this paper was consulted by a negro for what he himself denominated "upside-down sight," which, after a tedious and patient investigation, proved to be astigmatism. This patient was unable to distinguish or reckon time by the hands of a clock, whenever it was at a full hour, and from that peculiarity he knew it was the full hour; the quarters, halves, and fractional halves, were very distinctly told. Up to his death, he suffered from the defect, being unable to procure a lens, which was concavo-cylindrical on one side, and plane upon the other. The action of such a lens is owing to the cylindrical shape, "producing no convergency or divergency in parallel rays, incidental to the plane of the axis, whilst it converges or diverges rays in a plane at right angles to the axis, as a spherical surface of equal curvature would do." As we cannot, or at least do not, feel disposed to enter into the rationale of astigma-

[1] Gerson, De Formâ Corneæ, p. 17. Göttingen, 1810.

[2] Transactions of the Cambridge Philosophical Society, vol. ii. p. 267, *et seq.* Cambridge, 1827.

[3] Lawrence, Diseases of the Eye, p. 669, edited by Isaac Hays, M. D. Philadelphia, 1854.

[4] Cambridge Transactions, *loc. cit.*

[5] Monthly Journal of Medical Sciences, p. 711, April, 1848.

tism, we would omit anything more on the subject, as it can be found minutely detailed by Mr. Airy, in the *Cambridge Philosophical Transactions*, vol. ii. 1827, and in Mackenzie's work on the Eye.

The second abnormal phenomenon is known as *Dyschromatopsia* (from δυς, difficult, χρῶμα, color, ὄψις, sight), or insensibility to certain colors, the color-blindness of Sir David Brewster. Of late years, this affection has been very much investigated, and the propriety of such is readily appreciated, when we know that human life is at stake, and that many sad accidents have taken place on account of mistakes as to the color of railway and marine signals. Many instances are on record of individuals who were totally incapable of appreciating various colors, and of mistaking one color for another, such as orange for green, or *vice versa*.

Dr. Darwin, the poet and botanist, could distinguish a cherry from the leaves only by its shape. There is another case of a family in York, England, who were similarly affected with regard to full reds and full greens. Dr. Dalton, the discoverer of the Atomic Theory, and distinguished chemist, was likewise similarly affected. This defect was not known to him until, one day, discussing with a friend concerning the nomenclature of the colors of the solar spectrum, Dalton was unable to distinguish red, and all of the others consisted simply of yellow and blue. When made aware of his defect, it is said that he consigned to the flames a large manuscript, the contents of which were unknown. Dalton knew of twenty persons similarly affected as he was. Twice, with different classes of twenty-five pupils, he explained the defect, and detected the same misfortune in two of them. Prévost declared that five per cent. of the human race were color-blind.

Dr. Wilson seems to doubt Prévost's numbers, if applied to such cases as Dalton's, but admitted them with regard to blue and green; for out of 1154 persons examined in the city of Edinburgh alone:—

1 in 55	confounded	red	with green.
1 " 60	"	brown	"
1 " 46	"	blue	"

The proportion with respect to blue and green was accidentally discovered, as it was unsought for. With regard to red and green, and brown and green, they are, according to Dr. Wilson, but "degrees of the same affection; all in the first category, red with green, must be added to those in the second, brown with green; and many of those in the second might appear in the first; but no

one was counted more than once." Many cases have been related and detailed in various journals, books, and monographs, which were spurious, being diseases of the retina, and readily recognized by the ophthalmoscope; one such will hereafter be described.

There are two great classes of the color-blind, which differ in degree and character. Mr. Seebeck has given the best classification, and as such we will quote it. Seebeck's first class consists of those who differ considerably in the degree of their vision, yet agree very nearly in the confounding of the following colors.

"1. Sky-blue, gray-blue, and gray-lilac.
2. Lilac and bluish-gray.
3. Bluish-green and imperfect violet.
4. Crimson, dark green, and hair brown.
5. Rose-red, green (rather blue than yellow) and gray.
6. Pure light green, gray-brown, and flesh color.
7. Intense orange, light yellowish-green, or brownish-green, and yellow-brown.
8. Light orange and pure yellow."

Persons who come under this class, have generally a very imperfect idea of all colors, but particularly confound red with green, which appears to be of a dull gray; they also give the latter appearance to blue. Yellow they distinguish the most perfectly, but still lack the acuteness of perception of the normal eye.

Individuals of the second class have only an imperfect perception of the least refrangible rays, which is not the case with those of the previous class. These persons also recognize yellow the best, distinguish red better, and blue not so well as those of the other class. They more particularly confound:—

"1. Dark violet and dark blue.
2. Crimson and violet.
3. Rose-red, lilac, sky-blue, and gray (including lilac).
4. Brick-red, rust-brown, and dark olive-green.
5. Cinnabar-red and dark brown.
6. Imperfect (somewhat yellowish) rose-red and pure gray.
7. Flesh-red, gray-brown, and bluish-green.
8. Dark carmine and blackish blue-green.
9. Light orange, greenish-yellow, brownish-yellow, and pure yellow.
10. Bright orange, yellow-brown, and grass-green."

In speaking of the vitreous body, we mentioned Hannover's discovery of the segmentary disposition of that body, as revealed after a maceration in chromic acid. This discovery seems to have been totally neglected by all writers upon the subject of color-blindness, which, if properly reviewed, would explain the phenomenon, and suggest a remedy. The writer believes an explanation of the defect

of color-blindness can be made by the above mentioned segmentary arrangement of the vitreous body. Thus, we know the laws of the refraction of light, and the peculiar property which a triangular prism of glass possesses of refracting light, and of decomposing it into seven primary colors. For the knowledge of this fact, we are indebted to Sir Isaac Newton. He placed a prism opposite an orifice in a window-shutter, admitting a ray of light in a darkened room, and, as the result, the pure white light was found to be composed of seven brilliant colors, viz: violet, indigo, blue, green, yellow, orange, and red.

The solar spectrum with regard to each particular color is vivid only at particular parts, as they blend and mingle with each other in such a manner that it is difficult to say where each begins or ends. The violet rays bend most from their course, whereas the red ones are the least turned out; the other colors possess this property in the proportion as they are mentioned in the list. These seven colors were named primary, and considered as simple or homogeneous, particularly as they preserved their individuality when passed through another prism. Notwithstanding our incapability of analyzing these rays, they can synthetically, some of them at least, be shown to be compound. For artists have demonstrated that red, blue, and yellow would form all of the tints of the prismatic spectrum, and as no mixture would produce these colors, they were necessarily simple or homogeneous; and the others, viz: violet, indigo, green, and orange, as a natural consequence, were compound or heterogeneous. Every one is familiar with the experiment of Buffon, who showed that by steadfastly looking at a red, yellow, or blue spot, upon a black or white ground, a fringed border is recognized around each one of them, the tints of which are composed of three colors: thus, a green border is seen around the red spot, and green is composed of yellow and blue; a violet border is observed around the yellow spot, and violet is made up of blue and red; an orange border is perceived around the blue spot, and orange is a mixture of red and yellow. The experiments induced to explain the phenomena revealed by Buffon's experiments remained unsatisfactory, until Mr. Hay, of Edinburgh, scientifically demonstrated them in his work on the *Laws of Harmonious Coloring*. Sir David Brewster, Dr. Neil Arnot, F. R. S., Professor Holmes, and many other scientific persons have concurred with the opinions advanced by Mr. Hay. The writer of this essay has frequently verified them: his procedure and results are the following,

corresponding almost in every particular with those of the learned gentleman of Edinburgh. A prism was fixed in a hole in a shutter admitting a ray of light in a darkened room, and the decomposed light thrown upon a screen. Each color was successively put to the test, and was found incapable of being divided into two. A hole then was made in the screen, corresponding to the centre of the red of the spectrum, and another in that of the blue, and these colors were allowed to fall on a second screen. By means of a second prism the red ray was directed to the spot where also the blue appeared, in which spot they combined to produce as pure and intense a violet as was seen upon the first screen. Red and yellow were subjected to the same experiments, and a beautiful orange sprang forth; yellow and blue thus treated produced the prismatic green. After the above experiments were performed, a simple ray was thrown upon a compound color, and did not unite, for, as soon as red was thrown upon green, it vanished and black resulted; thus it was with the whole series. In another course of experiments two spectra were used, the one behind and of course a little above the other, and the same results were adduced. Thus, by synthesis it was clearly demonstrated that the three homogeneous colors, yellow, red, and blue, had an affinity for one another, which was wanting in violet, indigo, green, and orange; and, as a consequence, they could not be the same in every respect, save color and refrangibility. The three homogeneous colors, yellow, red, and blue, are in a numerical ratio as follows: yellow 3, red 5, and blue 8; and when any opaque body reflects these colors in such proportions, white is the result. In this condition they are in the active state, and each is neutralized by the relative effect of the others. These rays when in the *passive state* are absorbed, and black is the result. The effect is the same when transmitted through a transparent substance, but are *material or inherent* in the first case, and *impalpable or transient* in the second. Hence, color solely depends upon the refractive or reflective power of bodies. The opinion at present most generally received is, that according to the disposition of the minute particles of various bodies, so is their power of reflecting and absorbing rays; and as is the reflection and the absorption so is the color, which is not of itself an inherent part of a body. Color, when produced by artificial light, such as by oil, candles, or gas-light, the rays of which are not so pure as those of the sun, is very apt to be deceptive, so much so that every one will mistake pale blue for green, or *vice versa*.

What, then, is color? Color is the reflection of the rays which the object does not absorb! A white color is the reflection of all the rays, a black their absorption. A poppy is red because it absorbs all the other rays of the prism and reflects red; but, if it be seen through the medium of a compound color, a green glass for instance, there is an interference of rays, and the brilliant poppy appears to be black. Numerous instances of these apparent paradoxes might be enumerated; but these, as well as the discussion of the heat and actinic rays of the prism, are necessarily crowded out for the want of space.

Sir Isaac Newton discovered that different rays require different distances to bring them to a focus, or, in other words, that the momentum of each ray is different. The red is the soonest brought to a focus, and has the greatest momentum. It is on this account that in a fog the sun appears red, from the rays of this color possessing the force or momentum to penetrate the dense atmosphere.

White light has the regular recurrence of periodical movements at equal intervals (500,000,000,000,000) five hundred millions of millions in one second. Red to produce its effect undergoes (482,000,000,000,000) four hundred and eighty-two millions of millions in $\frac{1}{60}$ part of a minute! Yellow, to produce its sensation, affects the eye in one second (542,000,000,000,000) five hundred and forty-two millions of millions of times. Violet, to do likewise, must vibrate in one second's time (707,000,000,000,000) seven hundred and seven millions of millions of times.

Of all modern investigators, Sir John Herschel seems to have arrived at the most correct data with regard to the length and rapidity of the various rays of the solar spectrum; he gives them as follows:—

Colored rays.	Length of luminous rays in parts of an inch.	Number of undulations in an inch.	Number of undulations in a second.
Red	.0000256	39180	477 billions.
Orange	.0000240	41610	506 "
Yellow	.0000227	44000	535 "
Green	.0000211	47460	577 "
Blue	.0000196	51110	622 "
Indigo	.0000185	54070	658 "
Violet	.0000174	57490	699 "

The relative intensity of the light of the various portions of the solar spectrum, according to the calculations of Frauenhofer, are numerically expressed as follows:—

Violet	from 5 to 1
Blue, dark (indigo)	31
Blue of solar spectrum	17
Green	49
Between orange and yellow	100
Orange	69
Red, middle ray	94
Red, extreme ray	22

Having cursorily glanced at the theory, and the facts of color, we are prepared to enter into an explanation of the phenomenon of color-blindness. Rejecting all opinions heretofore maintained not as worthless, for many of them merit the most distinguished consideration, but as certainly not giving a very correct idea, the writer presumes the following:—

A. That light is transmitted by undulations.

B. That the different colored rays of the solar spectrum may be accounted for, by a difference in the frequency of *recurrence* in the vibrations.

That light is transmitted by undulations, no one doubts, and its discussion here would be *mal-apropos.* With regard to proposition B, the simple facts will be stated, not discussed. The diffraction and interference of light present phenomena which go to prove it; such as Newton's luminous rings, Grimaldi's *interior* and *exterior* fringes, and the estimates above mentioned.

Remembering Hannover's discovery that the vitreous body is composed of a series of segments, the writer believes *color blindness to be the result of an irregular prismatic refraction of light as it passes through that dioptric medium.* What conditions combine to produce such an effect, physical research has as yet been unable to demonstrate, but *a priori* reasoning by exclusion tends to that effect. For there are bodies which will transmit one kind of color and reflect another, leaf gold for instance, which transmits yellow, but reflects green. Again, some substances only reflect the various rays, thereby producing color, when they are of a certain thickness, beyond which they appear black. Most of the color-blind, and particularly in such as Dr. Darwin, the segmentary arrangement of the vitreous body is such as to induce a decomposition of light, and to bring the focus of two colors, a simple red and compound green, upon the same spot of the retina, and as a consequence their mutual disappearance, as proven by the experiments above quoted by the writer upon harmonious coloring. Now, if all phenomena ex-

hibited with regard to that abnormal process of vision (or color-blindness), can be produced physically by a series of prisms, does it not follow (as no other series of lenses can bring about the same effects) that it is reasonable to suppose the impressions conveyed to the brain by means of such images upon the retina, are similarly produced by a similar series in the vitreous body? We emphatically answer in the affirmative!

When we gaze upon the faultless beauty of the humble violet, the brilliant jonquil and the modest lily, we little suppose that billions of vibrations must take place before the proper image is formed upon the retina, and the sensation conveyed to the sensorium! What innumerable vibrations take place, when we look around and behold the various hues of all that exists in nature from the humblest pebble to the sublime snow-capped mountain! Yet, of all the millions of millions of vibrations, if *one only* should be lost, the color would be imperfect!

It thus seems, without reapplying the laws of coloring in detail, that color-blindness is a purely physical result of a disarrangement of the vitreous body, and that its remedy is the application of such substances, the wearing of various glasses for instance, such as light or deep orange, rose tinted, etc., with a certain amount of convexity or concavity, as the case might warrant, thereby preventing an interference of rays. We sincerely hope to see color-blindness as easily remedied, as either presbyopia or myopia.

Besides the above mentioned phenomena of vision, there are others which are entirely *subjective*, that is, such as afford evidence of the action of the retina, and which are not dependent upon the influence of the external agency of light. The most remarkable of these subjective phenomena, are what are denominated by M. Serre (d'Uzes) *Phosphènes* (Φῶς, *light*, and Φαίνειν, *to cause to shine*), and *Druckfiguren* by Purkinje. These are luminous images which are produced by pressure upon the ocular globe, whence a mechanical action upon the retina. The procedure of M. Serre consists in suddenly and gently tapping either with the extremity of the finger or the head of a pencil (over the closed lids) the globe of the eye, which produces the luminous rings in question.

The partial or entire absence of these rings, their indistinctness, or their segmentary appearance, is a precious source of diagnosis which permits us to recognize any threatening or actual lesion of the function of vision. The method of the writer to obtain the development of these phenomena, is to place the patient in a dark

room, and then proceed as M. Serre in the manner above described. The beneficial advantage which these *phosphènes* offer to the surgeon, is to enlighten him upon the state of the retina as regards the feasibility of an operation for artificial pupil, when adhesions or cataract totally obstruct the passage of any rays of light. M. Serre mentions four particular *phosphènes*, viz: *jugal*, *frontal*, *temporal*, and *nasal*. To produce either of which the eye must be compressed upon the opposite side; thus, to produce the *nasal*, the temporal margin of the globe is pressed upon or tapped, and so on with the others. In the first degree of *anæsthesia retinæ*, the *jugal* disappears; in the second, the *frontal;* in the third, the *temporal*: in the fourth, the *nasal*. When the latter is wanting, the others cannot be developed; but, in an inverse order, when the *jugal* is absent, the others remain; when the *frontal* is also absent, there still remain the other two; and when the *temporal* is also absent, the *nasal* remains, the obliteration of which indicates a complete *anæsthesia* or loss of sensibility in the retina. When, after an active or other treatment, the *phosphènes* begin to reappear, they do so in an inverse order to their disappearance; thus, the *nasal* being the last to disappear, is the first to reappear; then the *temporal*, *frontal*, and *jugal*. When the *jugal* phosphenic light is wanting, its absence indicates that the terminal portion of the retina alone is anæsthetic; the non-appearance of the *frontal* implies that a more distant portion is implicated; and the absence of the *temporal* and *nasal* ones, point out that a loss of sensibility has reached still more distant portions. The other subjective phenomena are of such physiological importance that space will not permit of their discussion; a mere mention will have to suffice.

A. Luminous appearances produced by the pulsations of the *arteria centralis retinæ*.
B. Phosphenic circles made apparent by a sudden lateral motion of the eyes.
C. Vascular figure, and visible movement of the blood, presenting a luminous appearance in the field of vision.
D. Electrical and galvanic productions of phosphenic circles.
E. Spontaneous phosphenes.
F. Narcotic and rotatory phosphenes.

We now propose to entertain, in as concise a manner as possible, some few of the peculiarities of healthy vision.

Vision is subject to two paradoxes; the first of which, *upright* or *erect vision*, or the seeing of objects upright by inverted images upon the retina. The second is the faculty of *seeing single with two such images*.

With regard to the solution of the cause of erect vision many theories have been advanced, which are as yet unsatisfactory. Kepler presumed that objects appeared erect, on account of the mind's perception of the impulse of a ray on the lower part of the retina; and he thought this ray to be directed from a higher part of the object, and *vice versâ*. The opinion most in vogue is that of Porterfield, sanctioned by Sir David Brewster and Mr. Reid, viz: that the mind never sees the picture painted upon the retina, and consequently never judges of the object. According to this law, all objects are seen in the direction of the perpendicular to a point of the retina, upon which any impression is made; hence, in seeing any object, in consequence of an immutable and known law, *the sensation is traced by the mind back from the sensorium to the retina*, and thence referred in consequence of the perpendicular lines to its proper place without the eye: or in the words of Carpenter, "as all the perpendiculars to the several points of the inner surface of a sphere meet in the centre, the line of direction of any object is identical with the prolonged radius of the sphere, drawn from the point at which its image is made upon the retina." Volkman,[1] upon a close examination, found this law to be optically incorrect, since the lines of direction cross each other at a spot a little posterior to the crystalline lens, and consequently falling at different angles on various points of the retina, no fixed and determined law can be promulgated concerning them.

Müller contends that erect vision consists only in the perception of the state of the retina itself, and not of any object placed anterior to it in the external world. He objects to the hypothesis of the "law of visible directions," and denies that the retina has an *outward* action, since there is no possibly apparent reason why one direction should have the preference to another; and if each ultimate sensitive portion of the retina had the power of action beyond itself, there would be produced as many directions as radii could be drawn from it to the external world. To use Müller's own words,[2] "If we do see objects inverted (or rather if the picture on the retina be inverted), the only proof we can possibly have of it is that afforded by the study of the laws of optics; and, if everything is seen reversed, the relative position of the objects remains unchanged. Hence, it is also that no discordance arises between the

[1] Volkman, On the Refractive Power of the Eye.

[2] Müller, On Erect Vision.

sensations of inverted vision and those of touch, which perceives everything in its erect position; for the images of all objects, even of our limbs, on the retina are equally inverted, and, therefore maintain the same relative position. Even the image of our hands when used in touch, is inverted."

The above quotation corresponds with the previously advanced ideas, by the writer, concerning the correlation of vision and touch. Now, it cannot positively be said that we perceive, or that the mind perceives, an image upon the retina; none but anatomists know it: for we are not conscious of its existence; *we perceive, or we see by means of this image.* Having thus premised, all difficulty seems banished, if this distinction be borne in mind. Why then, it may be asked, do we perceive an object in the upright position, when the image upon the retina is inverted? We see it in the upright position simply because it is inverted! This inversion is the necessary means of our so seeing the object.

Granting the above distinction, why is it that we do not judge of the object according to its sensible image? This is readily answered, since we have no knowledge or notion of *upright* or *inverted*, except such as is based upon experience; and, whatever be our standard of up and down, the sensible representation of *upright* will be an image upon the lower side of the retina, and of *downwards* just the reverse. The experience taught by the education of the senses in man, is intuitive or instinctive in animals. It seems to us that the various perplexities have arisen in consequence of the phenomenon of erect vision being produced by inverted images, or cubical and pyramidal, by means of an image upon the concavity of a sphere, or the perception of the many tinted colors of the rainbow upon a black surface. Well may the poet say:—

> "There is a voiceless eloquence on earth,
> Telling of Him who gave her wonders birth:
> Whose hidden but supreme control
> Moves through the world an universal soul.

The faculty of seeing objects single with two eyes, is very singular, and has occasioned much discussion. The fact is, that we are incapable of receiving two impressions from two images, but that, under certain, particular, and peculiar circumstances, one impression is formed of two. Each eye judges of the position of all objects directly within the field of vision. Now, when the two eyes are directed to any object, their axes meet in it, the two retinæ are opposite it, and all other points of the eye correspond mutu-

ally, in order to give the sensation of single vision. Therefore, when we look at a *distant* object, sufficiently far that the distance between the eyes becomes comparatively small, the two objects, being similar collections of forms, will coincide, if the corresponding points in both do likewise; this being the case, the double image of each object, falling upon corresponding points in the retina, becomes a single one.

Single vision from two images upon the retina is consequently but the result of an optical law, and it is a fallacy and mistaken notion to call in the aid of *habit* and experience to aid in its explication. For in ascribing single vision to experience, we necessarily infer an educational system of touch, or some such corresponding system, which is not true. Who would say that infants see everything double? Certainly no one, yet to prove such a doctrine, children would have to learn by experience that which they possess *per naturam*, and which would take a long time to be cognizant of. Another objection to such a theory is the simple fact that persons born blind, when restored to sight, *do not see double;* the only abnormal deviations being a lack in the power of adaptiveness with regard to perspective, etc. If two objects do not exactly coincide, the stronger impression absorbs the weaker, and the object is seen single. The writer has frequently verified this, by looking through two colored glasses at the same time,-blue and dark red, and looking at objects (although he has no defect of vision whatsoever), he sees them red or blue, according as one or the other is before the right eye, the other color being before the left eye. This plainly shows how completely the mind takes cognizance of one impression to an unconscious exclusion of the other, when this impression is communicated by one organ of sense, exclusive of its fellow. The above phenomena were discovered by accident, whilst observing an eclipse of the sun. Exciting some surprise in the writer's mind, he prosecuted these experiments, and discovered, in every instance, that one eye was *stronger* than the other, or, in scientific application, that distinct impressions could be made upon one retina to the exclusion of the other. The conclusions drawn from these phenomena were such as to induce the following theory upon single vision: *Impressions are made upon both eyes at separate times, one following the other so rapidly that almost simultaneously an impression is conveyed by each to the sensorium, which reflects a double sensation, but one after another; and, in this manner, objects are seen singly, in consequence of a series, as it were, of sensations.*

The duration of an impression upon the retina varies. Mr. D'Arcy found that when a live coal was swung around a circle of 165 feet circumference, the impression remained a little longer than one *seventh of a second* upon the retina. Again, when a first impression is succeeded by a second in such rapidity that the latter runs into the other, the two, as it were, become one. This is readily demonstrated by whirling a piece of burning stick, which seems to be a complete circle of fire.

That the phenomena of single vision cannot be explained by the peculiar decussation of the optic nerve at the *chiasma* hardly any one will deny, when the important experiments and discoveries of Prof. Wheatstone concerning the *stereoscope* are entertained. These discoveries go to show that the mental interpretation of sensory impressions is a *modus operandi* not to be explained by any structural arrangements of the sensory apparatus, and that it is a process entirely foreign from any affection of the consciousness by such impressions.

According to Prof. Wheatstone, the perception of distance or perspective, and the idea of solidity, are evidently produced by the combination of two pictures of a solid body taken from either eye, as from two different points of sight. A singular and curious fact, which goes to prove this, is that a person with one eye, in viewing any solid body, is constantly moving his head from one side to the other; the result of which is, that he, by this means, gets with one eye the same effect that is obtained by two eyes with the head stationary. These conclusions, concisely drawn from the opinions of Prof. Wheatstone, are not as fully elaborated as the writer would desire; any further explanation either of the *stereoscope* or *pseudoscope* would be useless, as Prof. W. has two very learned and able articles upon them in the *Philosophical Transactions* for 1838 and 1852.

We now come to the consideration of the ophthalmoscope, and the revelations made by this most ingenious instrument. This discovery, as applied to the investigation of disease, is of modern date, and we owe it to Helmholtz, Professor of Physiology at Königsberg, Prussia. Mackenzie, of Scotland, however, applied a rudimentary ophthalmoscope in the investigation of diseases within the eye, previous to 1840, of which the particulars will be given farther on.

The power of seeing the interior of the eyes of such animals as the dog and the cat, which are deprived of pigmentum, depends,

not as many observers have supposed, upon nervous influence, but upon a reflection of the light from their eyes, which had passed therein from without. Prevost, in 1810, was the first to demonstrate this fact, and proved it by showing that no such effect was produced in a perfectly dark room. Gruithuisen[1] came to the same results, and added that the phenomenon was in part owing to an extraordinary refraction of the crystalline lens: he examined the eyes of many animals, living and dead, and his experiments were confirmed by Tiedemann,[1] Rudolph,[1] Müller,[1] Esser,[2] and Hassenstein.[3]

Hassenstein believed that the power of seeing within the eye was due to the muscular contraction of the globe in its antero-posterior diameter. Rudolphi considered that the eye should be turned in a certain direction in order that the phenomenon of oculoscopy might be made apparent. Beer[4] was among the first to observe the phenomenon in man, in a case of iridemia or congenital absence of the iris, where the patient suffered from a tumor upon the retina, and he remarked, that in order to see within the eye of the patient, the observer should look into it parallel to the luminous rays which fall upon it. Brücke[5] and Cumming[6] both gave the same directions, in order that the interior of the eye might be seen, yet they never once sought to discover there any diseased condition by such a procedure; they merely advised it as a method in which the chambers of the eye could be illuminated. Their experiments were about the same; and consisted in placing the subject in a darkened room, the observer holding a lamp or candle in one hand, and a screen in the other, the upper border of which is held upon a level with the flame, in such a manner as to prevent the rays of light from directly impinging upon his eyes: he looks over the top of the screen towards the pupil of the patient, who is some eight or ten feet in front of him, and who looks, as it were, out upon darkness. In this latter position the patient's pupils present a brilliantly lighted appearance of reddish-yellow color, which immediately become black if turned towards the light. The rationale of this experiment will be explained a little farther on. In the early part

[1] Zur vergleichenden Physiologie des Gesichtsinns. Leipzig, 1826.
[2] Kastner's Archiv. für die gesammte Naturlehre. Bd. viii. s. 399.
[3] De Luce ex quorundum animalium oculis prodeunte atque de tapeto lucido.
[4] Hecker's Annalen, t. i. s. 378, 1839.
[5] Müller, Archiv. für Anatomie und Physiologie, s. 225, 1847.
[6] Medico-Chirurgical Transactions, vol. xxix. p. 284.

of the eighteenth century, Mery[1] having accidentally plunged a cat into water, very unexpectedly beheld the bottom of the eye, and distinctly saw the bloodvessels thereon. He gave no explanation of the phenomenon, but reported the fact to the Academy of Sciences in Paris. In 1709, five years afterwards, La Hire[2] and Latère[2] separately performed the same experiment, and both arrived at the same conclusion as to its explanation, viz., that we cannot see within the eye on account of the refractive power of the cornea and lens, whose normal refraction becomes neutralized by the action of the water, for the rays in passing out of the eye are divergent, but the water causes their convergence, and thus induces a focus to be brought upon the retina of the observer, and consequently an image there formed.

Kussmaul,[3] after having carefully studied the above described phenomena, repeated the experiments, and in 1845 published a monograph upon the subject. He demonstrated by dissection, that our inability to see the bottom of the eye is due to the refractive power of the cornea and lens. He took a sheep's eye and removed the cornea, and was still unable to see the retina: he then removed the lens, when all was visible, the transparent retina appeared with its bloodvessels, the papilla of the optic nerve stood out in bold relief, and the bright shining choroid glistened behind. Here was positive proof that the lens as well as the cornea exerted its influence upon the phenomenon in question, had we not previously known that the pupil still appears black after a successful operation for cataract.

The rationale of the experiments of Brucke and Cumming, quoted above, was not given until 1851, when Helmholtz[4] published his essay upon the ophthalmoscope. This distinguished *savan* explained the black color of the pupil by purely optical rules. Thus, the retina is not only transparent, but also reflects light, at least some rays which impinge upon it: these rays, in passing out of the eye, traverse the same media through which they entered, and come to a focus at the point of departure of the incident rays. The eye of the observer is too feeble to project sufficient light to illuminate the

[1] Ann. de l'Acad. des Sciences, 1704.

[2] Ibid., 1709.

[3] Die Farbenerscheinungen im Grunde des Menschlichen Auges, Heidelberg. 1845.

[4] Beschreibungeines Augenspiegel zur Beobachtung der Netzthaut in lebenden Auge, Berlin, 1851.

bottom of the eye explored, in order that the reflection there might throw an image upon the observer's retina.

From these propositions, the deduction is clear that, to see the retina of an individual, our own eye should be the luminous point, but our eye is too feeble to project a sufficient quantity of light to illuminate the eye explored—and as a consequence, in looking into an eye by the aid of ordinary daylight, our head would intercept the rays of light, necessary to the illumination; hence, being in the shade, the pupil would naturally appear to be dark and black. If the eye, on the contrary, instead of regarding a luminous point, is fixed upon a distant object, the rays reflected from the retina do not come to a focus at the point of departure of the incident rays, but beyond it; and, as these rays proceed in almost parallel bundles, a person placed anterior to the eye of the subject of the experiment, may easily perceive a portion of these rays. This is the rationale of Brüke's and of Cumming's experiments.

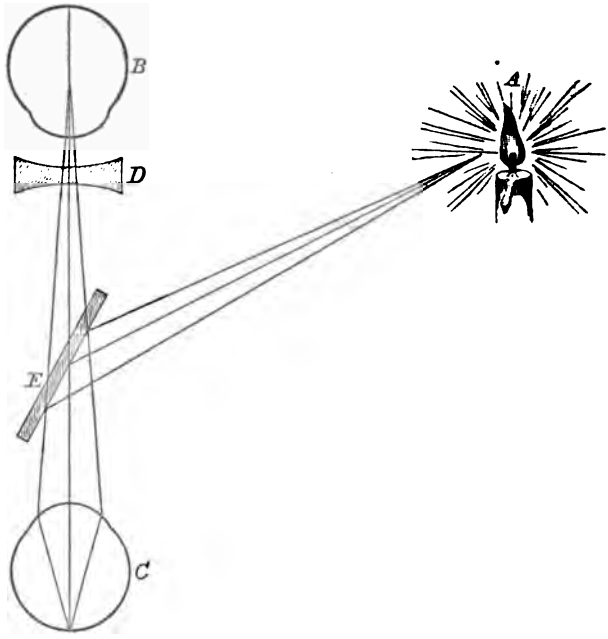
These facts led to the invention (not discovery) of the Ophthalmoscope of Helmholtz; for, upon the authority of Mr. Wharton Jones, Mr. Babbage has the priority of discovery. Mr. B. showed him an instrument in 1847, for the purpose of looking into the eye. It was made of a plain mirror, with the amalgam removed in two or three small spots in the centre; it was fixed in a tube at such an angle, that the rays of light falling upon it through the side of the tube, were reflected into the eye to be examined, to which one end of the tube was turned. The surgeon looked through the clear spots in the centre of the mirror, at the other end. This ophthalmoscope of Mr. Babbage was but the original of those of Graefe, Coccius, Donders, and Epkeus, and Meyerstein, which are but modifications of Helmholtz's. Helmholtz, although he introduced his ophthalmoscope four years later than did Mr. Babbage, is justly entitled to the distinction of being its inventor, as Mr. Babbage made no publication of his discovery. Reasoning upon the principles enunciated above, Helmholtz bethought himself of an artificial method of overcoming the insufficient reflection of the retina, or at least to devise some plan whereby the reflection from the retina would be so great, that the eye of the observer could, by being in the focus of the reflected rays, or at the point of departure of the incident rays, observe the bottom of the eye to be explored.

Von Erlach, who wore spectacles, observed one day, whilst con-

versing with a friend, that the sunlight was reflected from a neighboring window, upon his spectacles, and thence reflected into his friend's eye, very highly illuminating the pupil. He communicated this fact to Ruete and Helmholtz, and which undoubtedly led to the latter's using plate-glass reflectors in the ophthalmoscope which he invented in 1851. This instrument consists of a metallic tube or cylinder, painted black upon the inner surface; it is bevelled at one end to an angle of 56° to its axis; the other end is perfectly square, containing an eye-piece, composed of a diaphragm placed anteriorly to a bi-concave lens. Attached to the bevelled edge is a reflector of four highly polished and parallel pieces of glass.

The *modus operandi* of this *eye*-speculum is readily understood by referring to the annexed figure. The eye *B* looks into the eye *C*,

Fig. 8.



through *E*, consisting of a reflector, composed of four superposed glass plates, disposed at an angle of 56°, by which the light from *A* is reflected from it into the eye to be observed, *C*, in the same direction in which the observing eye looks. The eye *B* receives the reflected rays from *C*, converging so much, that the refractive

powers of the cornea, lens, and vitreous body, are not sufficiently strong to counteract; consequently, they do not come to a focus upon the observer's retina, thereby rendering him relatively myopic. To remedy this deficiency, Helmholtz introduced a bi-concave lens, which brings the rays to a focus upon the observer's retina, thereby producing an image of the internal structures of the eye, *C.*

Numerous ophthalmoscopes have been devised since the construction of Helmholtz's.

RUETE modified Helmholtz's by employing, instead of plate glass, a concave mirror (looking-glass), ten inches focus, having a small orifice in the centre, through which the surgeon looks into the patient's eye; a bi-convex lens is used to intensify the light.

COCCIUS'S instrument is a plain mirror, with a hole in the centre, and the light is concentrated upon it before it is reflected into the eye. Whenever either the surgeon or patient is myopic, a bi-concave lens is substituted to remedy the defect.

GRAEFE'S instrument is similar to the one claimed by the Greek surgeon, ANAGNOSTAKIS, as his invention. It consists of a concave mirror, of about two and a half inches in diameter, with a hole in the centre, through which the observer looks, the posterior surface of which is covered by a coating of blackened sheet copper; a bi-convex lens is used as in Coccius's. The writer, having read in Mackenzie's work on *Diseases of the Eye*, something concerning the claim of Anagnostakis to this instrument, whilst in Berlin, in the summer of 1857, made inquiries concerning it, and upon the authority of M. Lebrich, *chef de clinique* of Graefe, he learned that early in 1853, Graefe showed to the Athenian an instrument, the counterpart of the one described by him as being his own invention, the only difference being that Anagnostakis's is slightly the larger.

ULRICH'S is a similar one to Ruete's, but more compactly arranged.

FOLLIN AND NACHET'S is nothing more than Helmholtz's, with the addition of a bi-convex lens to condense the light, as it falls upon the reflector.

MEYERSTEIN'S is but a compact modification of Coccius's.

ZEHENDER'S is quite like Ulrich's, as is also HASMER'S.

DONDERS AND EPKENS'S instrument is a modification of Coccius's, the light being intensified as in Follin and Nachet's.

DESMARRES'S ophthalmoscope consists of a concave mirror of about 10 inches focus, constructed of burnished steel, with two small holes *near the circumference* on a line corresponding with its equator: the object of these two holes, is that the surgeon may use indiscriminately either the right or left eye. A bi-convex lens is used as in the application of Coccius's instrument. The writer prefers and uses Desmarres's instrument on account of its simplicity, and non-liability to get out of order: he also adds to it a bi-concave glass to remedy myopia, when any such patient is examined (according to the method of Coccius).

DIXON'S is upon the principle of Coccius, but is fixed in one of the rings of a spectacle frame: the other being balanced on the nose by a plane glass.

JAGER'S ophthalmoscope is said by many to be the most complete yet devised, but its complications are such, that when Desmarres's can possibly be used, it is by far the more preferable.

Thus having cursorily glanced at the various modifications of the ophthalmoscope without entering into their respective merits or demerits, it is deemed proper at once to enter into an account of the method of its use. As above stated, that of Desmarres is used by the writer, on account of its simplicity of construction and application: with it he proceeds as follows, always conducting the examination in a darkened room. The patient's pupil is at first dilated[1] by a solution of belladonna or atropia (neut. sulphat.); the writer prefers the atropine, and uses it in the proportion of one or two grains to the ounce of water. He places himself in front of the patient, seated preferably upon a music stool, as by so doing he can elevate or lower his position at will, which is a matter of no little importance.

A jet of gas covered by a glass shade, or an oil lamp, is placed to the left[2] of the patient upon a level with his eye, eight or nine inches from, and very slightly behind the head, in such a position as to have the eyes out of the immediate reflection of the light, and

[1] As to the dilatation of the pupil it is not necessary where the patient has an unusually large one, as in some cases of (so called) amaurosis. Frequently the healthy pupil is sufficiently large to allow of an ophthalmoscopical examination.

[2] With regard to the position of the light, whether it be to the left, or the right, or even above and behind the patient's head, is simply a matter of habit or convenience to the surgeon. The writer places the light to the left on account of custom, having first used the ophthalmoscope at the *cliniques* of the celebrated Desmarres, of Paris, where it is thus used.

in such a position as to receive the rays as propelled from the reflector of the ophthalmoscope. The surgeon then places his ophthalmoscope before either his right or left eye, the other being closed, and looks through one of the minute openings near its circumference, and causes the reflected light to fall upon the eye to be observed! A few manipulations with a bi-convex lens from 2½ to 4 inches focus will expose the internal arrangement of the eye. There are several important considerations to which attention must be given, before proceeding with the examination, viz., that the light be of sufficient intensity, that it be placed in a convenient position for the projection of the rays within the eye, that it be of varying intensity, and, that the patient be lower than the observer. Further on we will refer to the varying intensity of the light, as either the anterior or posterior portions of the inner eye are to be examined. After being properly arranged as regards position, light, etc., there still remain the greatest difficulties, viz., the bringing of the light to a focus so as to recognize the parts for which search is made. For the beginner this is extremely difficult: many and patient must be the sittings before he can acquire that degree of skill by which, at the first glance, he can immediately recognize the deep-seated structures, as there are certain very embarrassing obstacles to be overcome, such for instance as mistaking the image of the reflector for the papilla of the optic nerve. This obstacle with Desmarres's ophthalmoscope is easily remedied, as the two small holes near the circumference of the reflector appear as two minute black specks, which move in the same direction as the instrument is moved by the observer.

Another difficulty is the seeming impossibility of tracing the ramifications of any of the vessels, by neglecting to move the lens in an opposite direction from the point sought after. Again, the patient must keep his eye upon a fixed point, otherwise it is absolutely impossible to obtain the necessary reflection; and, all points to be examined should be placed as near as possible in a direct line corresponding to the axis of vision of the observer. Before introducing the lens, the reflection of the eye to be observed must be of a size corresponding to the reflector. The pupil at this stage presents a light yellowish-red color, like the tints of a summer's sunset cloud. The lens is now placed before the patient's eye, and, if properly adjusted, a most beautiful sight is revealed; but, if it be not properly adjusted, either the head of the observer, or the lens, or both must be moved slightly back-

wards or forwards, or laterally until a focus be obtained, when, if the eye examined be a healthy one, there will be displayed the

OPHTHALMOSCOPICAL APPEARANCES OF THE NORMAL OR HEALTHY EYE.

The first thing sought for is the papilla of the optic nerve, as, from its peculiar characteristic appearances, it serves as a valuable landmark. In looking for the papilla it is well to trace the vessels, seen upon the reddish-white concavity of the retina, in the direction as they grow larger, when, a little below the equator and slightly within the axis of the eye, there will be seen a white shining circular spot of about four lines diameter, resembling the full moon in a clear sky. This papilla, which is nothing more than the termination of the optic nerve, slightly projects over the surrounding parts, thereby producing an apparent shading of the retina, but which truly is nothing more than the dark choroid seen shining through the transparent retina: this shading is known as the *periphery* of the papilla, and is generally surrounded by a slight grayish ring, composed of fine points of pigmentum resting upon the choroid. The dimensions of the papilla vary both in the living and the dead. Huschke came to the conclusion after many autopsies of healthy eyes, that it never exceeded one line in diameter. The mean diameter of over fifteen hundred reported ophthalmoscopical examinations of the papilla, as seen through a bi-convex lens, is 3½ lines. It frequently varies, more particularly with individuals affected with myopia and presbyopia. With short sighted individuals, when examined without the lens, the papilla seems to occupy the whole range of sight, if the pupil have not previously been dilated with atropine: if the lens be introduced then all appears just to the contrary, for the papilla appears much smaller than normal. In persons who are affected with presbyopia, the papilla without the lens seems very small, whereas the glass appears really to magnify it. From these apparent anomalies, it follows that in examining a short-sighted person, a lens decreasing in strength should be employed in a ratio as the myopia increases; and, with presbyopic individuals, the lens should be larger in proportion as the defect is more marked.[2]

[1] *Vide* Appendix, Figure I.

[2] Desmarres and Graefe advise the habitual use of the same lens in all examinations, as by it any abnormal appearance, however slight, can be the more readily appreciated, and the surgeon the more quickly see the necessity of using any other, such as the nature of the case might call for.

Springing from the papilla, but by no means always from its centre, is the *arteria centralis retinæ*, which frequently divides into four branches, two ascending and two descending, which go to form capillary loops throughout the whole of the retina, and then anastomose with the veins of the same name, which run nearly parallel to the arteries, and which pass out where the arteries enter. (*Vide* Fig. I., Appendix.) The veins are somewhat larger than the arteries, slightly more tortuous, and of a darker color. In cases of congestion of the retina, the writer has been able to count the pulsations of the arteries. Surrounding the papilla of the optic nerve is the *retina*, a transparent membrane, furrowed by bloodvessels, presenting a tint varying from a deep red to a pale rose color, and forming a concavity presenting anteriorly. The retina is of itself perfectly transparent, and the varying tints depend upon the color of the individual; hence, the color of the choroid. The retina would not be at all recognizable, were there no bloodvessels furrowing its surface. In Albinos, there being a diminution or even a complete want of pigmentum of the choroid, the retina appears to be of a pale rose tint, whereas in persons of a very dark complexion, negroes for instance, it is of a deep red, owing to the greater deposition of pigmentum in the choroid: with all individuals its color varies with the color of the skin.

The vessels of the retina, decreasing from behind forwards, towards the *ora serrata*, are but the continuation of the artery and the commencement of the vein, described above as springing from and entering the papilla. They present the general characteristics of color, size, and tortuosity, as veins and arteries most frequently do, only the former are more numerous than the latter. The yellow spot of Sœmmering, as seen by the ophthalmoscope, presents a brilliant yellowish appearance, with a depression in the centre, and is always found in the centre of the visual axis. Desmarres, from ophthalmoscopical observations, denies the existence of the *plica transversalis;* but it nevertheless exists, and is no *post-mortem* formation from shrinking of the retina. For, if the light be concentrated by a bi-convex lens upon the reflector, previous to its being thrown in the eye, it then becomes sufficiently intense, and the plica presents the same appearances as before described.

The *choroid* is readily recognized through the transparent retina, and presents a series of irregular blackish radiating striæ, arising from the circumference of the papilla of the optic nerve, and which

pursue a direction in lines of unequal length towards the *ora serra*; about six lines posterior to this point they form a series of bifurcations, until lost within its substance. These striæ are formed by deposit of pigment cells and granules, which are of a more intense color than the surrounding parts, as seen through the transparent retina. They have not been inaptly called the *choroidean arborisations*, and they vary in intensity in the same ratio as the choroid, which, as above mentioned, varies with the hue of the skin. In Albinos there is a complete absence of them: in the negro they are most beautifully developed. And so it varies in blonde and brunette, the one having blue eyes, fair hair and complexion, has less pigmentum; the other with a flashing eye, sparkling like the meteor of an August night, with hair as the raven's wing, and face as the olive's hue, possesses a choroid strongly charged with pigmentum. Between these *arborisations* there are seen patches of a beautiful rose tint, furrowed with the vessels of the retina. Having thus cursorily glanced at the normal condition of the eye, as seen by means of the ophthalmoscope, we are prepared to enter into a discussion of its utility as revealing diseased conditions, such as without its use would remain unknown, or at least without a diagnosis during life; and, whether the ophthalmoscope be of any benefit as to the therapeutics of impaired vision.

Prior to Helmholtz's discovery, there is but one case on record where the agency of external light was used in the investigation of diseases seated in the deep-seated structures,[1] and oculists were able

[1] In *Mackenzie's Practical Treatise*, p. 508, 1840, the following may be found: "I had under my care, at the Glasgow Eye Infirmary, a young man with incomplete amaurosis in each eye. His vision had failed suddenly about two years before. At that time it was subject to frequent alterations, becoming suddenly diminished, and as suddenly regaining its usual acuteness. He complained of headache, with painful sensations over the body. He was troubled with red spectra before the left eye, but not before the right. The left eye was presbyopic, but with the right eye he perceived near objects more distinctly than distant ones. Deep in the right vitreous humor, a spotted opaque appearance was observed. On dilating the pupil by belladonna, it was evident that there were two sets of opacities behind the lens. One, consisting of a central spot, with numerous opaque threads radiating from it, especially downwards and outwards, was situated exactly in the axis of the eye, and a little way behind the lens. The other opaque spot was much deeper in the eye, but without radii, and evidently moved up and down when the patient moved his eye. Each pupil possessed considerable power of motion, and there was no tremulousness of either iris. I considered the appearances in the right eye as indicative of inflammation of the hyaloid. In two subsequent cases, I have seen similar appearances. *In one of these I discovered what I*

to recognize only such diseases as were manifest to inspection, such as were seated upon the external parts of the eye, or anterior to the vitreous body, unless there existed some preternatural arrangement, as in Beer's case of congenital absence of the iris above mentioned. In rare instances some very expert diagnosticians observed a commencing cataract, but only after it had reached a comparatively considerable size, for the simple thin striæ recognized by the ophthalmoscope necessarily must have escaped the most rigid examination.

As to recognizing the pathological conditions of the deep-seated parts, all diagnoses had to be made *per exclusionem;* and in all treatises upon the eye, with regard to the subjects of amaurosis and amblyopia, page after page is filled with the subjective symptoms of diseased retina, optic nerve, and brain, as to the production of these diseases. Now, with regard to the discovery of the ophthalmoscope, it is for ophthalmology what auscultation and percussion are for the physical exploration of general diseases, which were at first feeble in their results, producing but meagre benefits, but are at present mighty as a giant oak, towering far above the other trees in the forest of medicine.

It is a principle of fundamental philosophy which holds good throughout the whole fabric of creation, that in order to remove an evil we must know its cause. It is upon this principle that therapeutics and diagnosis are based, and the former resting upon experience, begins where the latter ends, and when diagnosis fails there is no rational therapeutics: even empirical therapeutics loses all consideration if not based on sufficient differential diagnosis. A cure supervening upon any peculiar treatment, a question naturally arises, what has been cured? Hence, every assistance in the exploration of disease is a most welcome light in the search for truth, particularly when it renders us able to observe the changes in morbid structures, and associate them with functional derangements. Thus, it is with the ophthalmoscope! By it we are able to refer the evil to its cause, and boldly strike at its very root. Many, very many diseases of the eye, embraced under the head of

considered the effects of hyaloiditis on DIVERTING THE LIGHT OF A GAS JET THROUGH THE PUPIL WITH A LENS."

T. Wharton Jones, F. R. S., says: "Furthermore, Dr. Mackenzie tells me that by concentrating the daylight by means of a convex lens, he has seen red angular patches on the retina. The retina, when bulged forward and flapping in the dissolved vitreous humor, can be well seen."

nervous or *amaurotic* affections, whose nature was misunderstood and whose treatment has led to many injudicious if not fatal consequences, have been proven by this instrument to be totally local and not in the least referable to the brain. Take, for instance, an affection which has lately been discovered to have been frequently referred to a wrong cause, and consequently treated empirically and irrationally. We refer to *myodesopia* or *muscæ volitantes*, symptoms frequently met with in all kinds of medical practice. Yet, Mackenzie[1] devotes twenty pages to the consideration of this subject, dividing it into *sensitiva* and *insensitiva*, and again subdividing it into other heads, learnedly descanting upon the various forms as depending upon a variety of causes, proposing prognosis and treatments, fixing their causes in the brain, the optic nerve, retina, vitreous body, lens, cornea, and aqueous humor; and, still Mackenzie is about the highest authority we have upon the subject of eye diseases. Many hundreds, yea thousands of practitioners strictly follow him to the letter as regards treatment, etc., blindly following his directions, and urging onward the unhappy victim of misplaced confidence. Visions of cupping, bleeding, leeching, and purging, rise in ghastly array! Setons and blisters, fell caustics and rank poisons follow on, swelling the list in horrible numbers! Turn we away from the unhappy picture, and behold the brighter side! These formidable *muscæ*, which for years past have arisen from a mind diseased, are, by the ophthalmoscope, brought to their proper sphere, for Desmarres, Graefe, Donders, Arlt, and Van Trigt, have found that the greatest number of these cases were nothing more than a commencing cataract, or probably some floating particles in the vitreous body, or punctiform blood-spots, or an entozoon upon the retina, or a hopeless disease of the choroid, or an alteration in the papilla of the optic nerve. And all of these diseases deserve at least a different treatment, which is rather negative than otherwise; and, if the ophthalmoscope has not induced a curative treatment or beneficial therapeutics, it has at least saved many an unfortunate individual from an useless course of medicine. For who would treat any of these affections (save, perhaps, punctiform blood-spots upon the retina) in a constitutional manner? Certainly no one! Yet, reason and the severest inductive analysis would tell us to so do, as the seat of reason, "the dome of thought and palace of the soul," affect such symptoms when deranged; but, fortunately

[1] A Practical Treatise on the Diseases of the Eye, by William Mackenzie, M. D., loc. cit.

e call in the aid of a little yet mighty instrument, the ophthalmoscope, and see if the patient need the fearful array of implements necessary to beat down inflammation of the brain and its membranes, or whether the troubled mind of a fellow being can be alleviated by the sweet assurance that he is not vitally hurt, and that useless medication need not be persisted in, as it is a sure precursor to after-constitutional diseases. The same remarks are pertinent to various other affections of the eye, as brain diseases present all the symptoms which are also met with in *extra-cerebral* diseases of the inner portions of the eye. Such, for instance, as the appearance of a black cloud hiding a portion, if not the whole of objects from the vision of the patient, or a crossing myopia, which is the apparent crossing of objects seen at a little distance. The ophthalmoscope has discovered the latter symptom to be due to a *posterior sclero-choroiditis*, and the former to a variety of pathological conditions, more particularly, however, to a *detachment of the retina.* Yet, how many treat these diseases empirically, not knowing what they do, and still at the same time are high-minded, honorable, and conscientious physicians. These lamentable facts are but stronger reasons why we should hasten to avail ourselves of every means of physical exploration, as applicable to the cure of disease, and of alleviating suffering humanity, advancing our science to a rapidly approaching perfection, and thereby promoting the moral tone, the honor, and the ability of the profession, so that each individual may become an ornament to society, a healthful member of the body politic, and by his integrity let it be said of him, *dux hominum medicus est.*

As above mentioned, one of the greatest advantages which the ophthalmoscope offers, is the ready recognition of *cerebral* and *extra-cerebral* amaurosis (so called), for a physical exploration of the eye immediately reveals whether or not it be the seat of disease or of derangement.

With one who is skilled in the ophthalmoscopic art, how easy it is to save the willing patient from "a course of mercury," holding out as hopeful a hopeless termination. One of the first principles of the *morale* of the science of medicine is to alleviate, not to harm. We shudder to think of the baneful errors committed in the name of medicine, and yet would be the last to say that they were knowingly so done, hence we grasp with avidity all diagnostic helps, and cry out with thanks to their inventors. Humanity thanks Helmholtz, medicine honors him, and charity lauds him as a benefactor!

Who would, possessing ophthalmoscopic knowledge, treat *sparkling synchisis* of the vitreous body, formative cataract *striæ* of the lens, *muscæ volitantes* arising from entohyaloid bodies, and a thousand and one other amblyopias with mercury? No one of conscience, yet we do it, promising a cure to the patient, at the same time defibrinating him, entailing untold miseries upon him and his offspring unborn. Ay, frequently does the physician, from an incorrect diagnosis, become the instrument of the revelation of the prophecy, that the sins of the father shall descend to his children, even unto the third generation. Witness the various statistical reports of surgical operations throughout the whole of the civilized world, and there count how many are attributed to mercury! Do not think that we decry mercury, far from it, we look upon it as one of the most useful remedies in the whole pharmacopœia, yet when unskilfully and wrongly used, it becomes as fire in a powder magazine. Thus, much of the unskilful application of mercury may be avoided by a judicious use of the little yet mighty ophthalmoscope!

Henceforth the words "amaurosis" and "amblyopia" may be expelled from the dignified positions which they formerly held in the category of diseases, and always known as symptoms only, of the numerous affections recognized by the potent instrument in question. Amaurosis and amblyopia may be considered symptomatic of cerebral disease; of hyperæmia, anæmia, atrophy and hypertrophy of the papilla of the optic nerve; of detachment, œdema, inflammation, congestion and apoplexy of the retina; in fact of the various pathological conditions which will be sketched further on. Included among the primary results above mentioned, to the pathologist, accruing from the use of the instrument, there are also many secondary beneficial results which assist the surgeon, as to the propriety of operating for the various diseases requiring such interference.

We are now prepared to enter upon the consideration of some of the anomalies of vision as revealed by the ophthalmoscope, or rather to sketch the pathological conditions of the various parts of the eye as seen by means of this instrument which constitute the

OPHTHALMOSCOPICAL APPEARANCES OF THE ABNORMAL OR UNHEALTHY EYE.

Omitting the diseases of the cornea and the aqueous humor, together with the entozoa found there, we proceed to glance at the affections of the

Crystalline Lens.—The most frequent diseases of this body are what are known as lenticular and capsular cataracts, and at certain stages of development are readily recognized without any aid to the naked eye. Frequently, however, the surgeon is consulted at a very early stage in the progress of the disease, and a judicious examination may save the patient a considerable degree of useless medication for *muscæ volitantes.* At this stage the surgeon will see (after having well dilated the pupil with atropine, and using a light, less intense than such as is used to explore the deeper structures) delicate *cataract striæ*, either in the centre or upon the circumference.

The method of detecting the seat of these striæ is the result of a *per exclusioneum* reasoning. The patient is directed to turn his eye upwards, and the streak upon the posterior portion either of the capsule or lens, instead of being dragged upwards as if it were on the anterior surface, is on the contrary depressed from its pre-observed situation, so much so that it becomes hidden behind the inferior segment of the iris. If the patient looks downwards, the reverse of this takes place. The catoptrical test of Purkinje answers very well for all cataracts after a certain period of development, but it cannot demonstrate as does the ophthalmoscope, the formative stages, such as the striæ above mentioned, the presence of a very slight false membrane, or of pigmentary cataract, which consists in the deposition of pigment granules within the substance of the lens, which, according to Desmarres, constitutes more than 30 per cent. of so called *muscæ volitantes.* Anæmia of the choroid is most generally associated with opacity of the lens, for vision does not solely depend upon the amount of light, but frequently upon the quantity of blood in the various tunics; and, the greater the amount of blood, less than congestion, the better the sight, owing to the relation between all parts of the eye. To observe the affections of the *vitreous body*, the use of the bi-convex lens may be dispensed with. The most frequently observed affections of this medium are *sanguineous effusions, floating bodies, glistening or sparkling synchisis*, and *urinoid turbidity.*

A. Sanguineous effusions are most frequently the result of a rupture of the vessels of the retina, or a sub-retinal apoplexy producing a rupture of that tunic, thereby permitting the blood to be effused within the substance of the vitreous body. Farther on we propose to give the differential diagnosis between an effusion of blood within this medium and a sub-retinal effusion.

B. Floating bodies are free and mobile, of variable forms and

dimensions, most generally seen as minute corpuscles. These corpuscles are either the *débris* of a sanguineous effusion, or are fibrino-albuminous exudations the results of a previous inflammation, and appear black in consequence of the absorption of the refracted light. Perhaps these corpuscles are the combined results of all of the above mentioned causes. However, whatever be their nature, they are seen flying about, as it were, within the vitreous body when the eye is in motion, appearing and disappearing at each moment. These floating bodies are generally connected with a preternatural fluidity of the vitreous. What is the normal fluidity of the vitreous has not as yet been determined; and, in a healthy eye, no mobility or fluidity can be perceived. In the majority of cases where these floating bodies have been observed with fluidity of the vitreous, it was referable to some antecedent syphilitic taint. These corpuscles may sometimes be confounded with cataract-striæ of the lens, but a little attention may prevent such an error. Thus, if the patient be told to look alternately upon two fixed points the cataract-striæ will be seen to be moving always in the same direction, but if the abnormal products be corpuscular floating bodies, they will be seen swimming about in various directions, never the same.

Sometimes the papilla of the optic nerve, in short-sighted individuals, is mistaken for a free foreign body within the vitreous. This may be detected by using a bi-convex lens, and causing the patient to execute slow lateral movements of the eye, when the assumed foreign body will be seen to be moving always in the same direction, possessing the uniform silvery white color, characteristic of the entrance of the optic nerve. Sometimes these floating substances assume an arachnoid appearance, having either free or attached borders, sometimes both. Again, they may be one or two, or several distinct masses of shreddy gray exudation-plasma, and may even hang pendant like a curtain. This complication affects vision less than do many small bodies moving about in all directions. Another complication is,

c. Glistening synchisis (Σύγχυσις, from συγχύω, I mingle), which consists of the presence of a number of small scales or crystals of cholesterin. Desmarres was the first to describe this affection, and he observed it to be frequently complicated with other floating bodies. When the complication exists, an ophthalmoscopical examination reveals a most beautiful sight, for the glittering cholesterin scales, by their reflection, act upon the other bodies, giving them

the most brilliant hues of the rainbow, and the scales themselves present a more beautiful exhibition of natural pyrotechnics than artifice can possibly devise.

D. The last form of floating bodies consists in an *urinoid turbidity*[1] of the vitreous humor. Desmarres reports the only cases on record of this affection, which consists of a more or less notable quantity of microscopical corpuscles, giving the vitreous the appearance of the urine of herbivorous animals. These corpuscles are composed of an albumino-fibrinous exudation, the result of a previous inflammation.

As to the treatment of these various affections of the vitreous body, it consists in the prevention of medication: it would be just as probable to see a man's head absorbed as many of these floating bodies.

The diseases recognized by an ophthalmoscopical examination of the *retina* are either *simple* or *complicated*, that is to say, they are seated in the retina only, or extend to other structures. We propose noticing the *simple* ones only: the *complicated* ones will be described when the affections of the other structures are entertained. The *simple* diseases are *œdema*, *anæmia*, *hyperæmia*, *separation* or *detachment*, and *apoplexy*.

Œdema is the result of a sub-retinal serous infiltration, referable to some obstruction of the circulation, either mechanical or otherwise. The ophthalmoscope reveals a swelling, circular in form, surrounding the papilla of the optic nerve, somewhat raised above the other parts of the membrane, and whitish in color, with very minute punctiform blood-spots scattered through it. This œdema is sometimes associated with sub-retinal apoplexy, and is frequently seen when there is either papillary or retinal hyperæmia, or both. Desmarres frequently diagnosticates *morbus Brightii*, or at least suspects it, when there is considerable amblyopia and other concomitant constitutional symptoms, and when *œdema retinæ* is revealed by the ophthalmoscope. We have frequently seen the French oculist detect albumen in the urine of such patients. Donders, of Utrecht, has likewise observed the same pathological changes in the retina, and upon several *post-mortem* examinations he has de-

[1] Desmarres calls this condition, *état jumenteux du corps vitré*: as there is no word in English corresponding to *jumenteux*, an adjective from the substantive *jument*, a mare, we metonomyze, as it were, a translation, and render it "urinoid turbidity," as the urine of the mare, as well as of all herbivorous animals, is more or less turbid.

tected fat globules deposited therein: hence, he called œdema of the retina, attendant upon *morbus Brightii, fatty degeneration of the retina.* The treatment, as a consequence, is necessarily *ad expectandum*, and must be followed upon general principles. In albuminuria—the writer has seen several cases (one in Paris and three in the United States), wherein an ophthalmoscopical examination revealed a deposition of pigmentum between the forks or divisions of the vessels upon the retina. (*Vide* Appendix, Fig. X.)

Anæmia retinæ is a consequence (most generally) of a constitutional anæmia, or it may be partial and dependent upon some local cause. The ophthalmoscope reveals a general paleness, either of the whole retina or of a part, as either one or the other is affected, and in proportion as is the anæmia so is the pallor: the vessels are smaller than normal, so small sometimes as to appear perfectly empty, and the arterial pulsations cannot be detected. The affection is characterized by more or less amblyopia, and sometimes by a complete amaurosis. The treatment is by tonics, more especially the chalybeates, fresh air, generous diet, etc. The patient should be particularly guarded against using his eyes in such a manner as to overtask them: the writer has frequently seen incurable anæmic congestions of the retina result from such imprudences.

Hyperæmia retinæ (Fig. XI., Appendix) is the most common of all intra-ocular lesions, and at the *cliniques* of Desmarres and Sichel, in Paris, and the *Augenklinik* of Graefe, of Berlin, hundreds of patients thus affected present themselves during the year. One half of the ophthalmoscopical observations noted in Desmarres's case-book indicate this lesion: during a three months' course there, the writer has notes of over forty such cases, the majority of whom were women who sewed for a livelihood, and the others were made up of artisans whose labor required a considerable degree of fixedness of sight upon small objects, such as engravers, printers, instrument and watchmakers, jewellers, etc. etc. There also were glass-blowers, cooks, bakers, etc., who are particularly prone to all intra-ocular diseases from the varying intensity of heat and light to which they are subjected. The second category embraces those, whose amblyopia is readily explained by a mechanico-physiological over-use of the eye; whereas the first class and by far the greatest number of amblyopics are sewing-girls, tailors, etc., who, to the causes pertinent to the second class, have added a sedentary life, close and heated rooms, everything in fact tending to a cachectic disposition or habit, inducing local hyperæmias, congestions, and in-

flammations; and the retina is by election, as it were, the most frequent seat of such changes in the eye, in the quantity and quality of the blood.

The ophthalmoscope reveals a turgidity of all the vessels, a marked injection of the veins in particular, of which there is a fresh crop developed by the increase and dilatation of the capillaries. The retina proper loses, in a measure, its brilliant transparency, and becomes of a deeper red, and looks drier than normally. The most frequent complication is a hyperæmia of the papilla of the optic nerve, of which more anon.

Were it not for the ophthalmoscope this affection would not be recognized (at least by any external evidence), for at first the symptomatic amblyopia is but slight, and it is here that therapeutics come to the rescue, and save perhaps an ulterior destruction of the functions of vision. A proper and judicious course of mercury, joined to other antiphlogistic remedies, at this stage is of the first importance; but, if the hyperæmia should have gone beyond, to a condition of apoplexy or of detachment of the retina, then, as before mentioned, mercury is but an useless and baneful remedy. Other frequent complications are, the *œdema* above noticed, *hyperæmia of the choroid*, *sub-retinal apoplexy*, *atrophy of the papilla*, and *posterior sclero-choroiditis*.

Detachment of the retina from superjacent parts is an affection of more frequent occurrence than is generally supposed; yet some of the latest writers on the subject of the diseases of the eye hardly more than refer to it. Mackenzie indicates such an affection, Nélaton[1] describes it only when it has reached such a degree of severity, that the whole retina is floating in the vitreous humor, so as to be readily recognized behind the lens: he advises the method of Mr. Ware, of making an exploratory puncture, to see if this foreign floating body really be a cataract or not. Desmarres,[2] in his first edition, gave a more detailed description of the affection, but like Nélaton he spoke only of such cases as were easily appreciated by the surgeon's eye alone. At present, all of the European oculists use the ophthalmoscope, as being absolutely necessary to recognize with precision such a pathological condition of the retina as a detachment would present. For, as above mentioned, when speaking of the utility of the instrument, we noticed the benefits accruing from an early recognition of any intra-ocular lesion whatsoever, and

[1] Nélaton, Elements de Patholog. Chirurg., t. iii. p. 212.

[2] Desmarres, Traité Théor. et Prat. des Maladies des Yeux, p. 710.

at present, in considering a disease, the ulterior termination of which is a certain destruction of sight, it is of the greatest importance to diagnosticate it at the very beginning. For, according to Desmarres and others, an early diagnosis of the disease sometimes brings about a cure, and judicious treatment may induce an absorption of either the serum or blood effused which produces the disease, and this being done, the retina recovers its healthy tone.

The rational symptoms generally come on in a regular order: the patient at first perceives luminous images as a result of the compression made upon the retina by the effusion. These images frequently affect the various colors of the prism; sometimes they are seen as through a colored veil, of a relative and proportional size corresponding to the effusion. Later the patient is struck with sudden blindness, all before him appears as black as night, or, if not so complete as total blindness, a dark cloud screens a portion of objects within his field of vision. In some instances he can trace the shape of the screen, which corresponds to the effusion upon the retina (in shape), as seen by the ophthalmoscope. The *phosphènes* before mentioned are recognizable if there be not complete anæsthesia of the retina, and as is the seat of these luminous rings, so is the chance of a recovery of complete vision, provided the absorption of the effusion can be induced.

There are two kinds of retinal detachments, referable to the effusion of either serum or blood. *Physical or ophthalmoscopical symptoms.* In order to recognize these detachments, it is not always absolutely necessary to use the bi-convex lens, and when the detached portion is seen, it is well to cause the patient to execute rapidly certain lateral and vertical movements of the eye, when the tumor will be recognized.

A. Detachment as a result of a serous effusion. The base of the eye presents a tumor of a whitish, or bluish, or grayish, or even reddish color, of a variable form and dimension: the tumor presents some red lines, which are the vessels of the retina furrowing it even in its abnormal projection beyond its natural plane. Sometimes the retina is of a dull white color, presenting the appearance of a false membrane, but the presence of the vessels and the suddenness of the attack would preclude such a supposition. Upon a careful examination the detached portion may be seen floating in the vitreous humor, and with a bi-convex lens the line of separation, between the detached tumor and the retina in its place, may readily be traced by fixing one of the vessels, and following its

course until it suddenly bends, as it were, upon itself. Having thus done, the tumor presents itself frequently as an opaque body, not glistening and shining as does the normal and healthy retina lying in its proper position. This condition may be complicated with any or all of the other intra-ocular diseases.

B. Detachment as the result of a sanguineous effusion, or sub-retinal apoplexy. The rational symptoms are pretty much the same as in detachments, the results of serous infiltration, with this difference, that they are more sudden. The cause is a rupture of one or more of the swollen, turgid, or diseased vessels of the choroid, happening most frequently in that pathological condition denominated by Graefe, of Berlin, as *posterior sclero-choroiditis.* A sudden rupture of a vessel behind the retina, rolls this tunic (by the accumulation of blood between it and the choroid), forward into the vitreous humor. An ophthalmoscopical examination reveals, in such an instance, a tumor of a deep red color, formed by the prominent retina; the blood itself may be seen through its walls, the retinal vessels are seen furrowing it, and trembling, as does the mass, when the movements of the eye are communicated to it. The conditions of the parts do not always thus remain; frequently the effusion is much increased, so much as to interfere with the nutrition of the retina, in such a manner as to produce its entire absorption in one, or several spots, or its bursting or rupturing, causing an effusion of blood into the vitreous humor, where, later, it forms one species of foreign bodies above mentioned. Sometimes these effusions do not produce a tumor, but are extravasated under the retina, and pass forward to be evacuated, as it were, from the *ora serrata*, to be adapted to the *fossa hyaloidea*, presenting a concavity, as if the whole vitreous humor were completely filled with blood. The fixedness, however, of this concavity precludes its being within the vitreous, as all foreign bodies partake more or less of the mobility of that body. Desmarres, after many ophthalmoscopical examinations, has discovered a new rational symptom, which is still a physical sign of sub-retinal sanguineous effusions, viz., a preservation of all the characteristics of the iris, save its color, which becomes of a dirty green color, owing to an overdue compression exercised by the effused blood. These effusions frequently undergo variations of color, being at first of a deep red, then of a light pink, afterwards of a muddy yellow, and finally gray; these transformations in color being nothing more than the usual changes undergone by subserous effusions of blood. When

these effusions are not, or are only partially absorbed, an inflammation is set up around, exudative most generally in its character, and false membranes are formed; a choroiditis ensues, followed by a maceration of the pigmentum, inducing most serious and incurable derangements in the functions of vision. As in serous effusions, relapses from a partial cure of sanguineous effusions are not perceived by the patient, who, *nolens volens*, becomes totally amaurotic, applies to an oculist not using the ophthalmoscope, is put upon a "course of mercury," undergoes that treatment for six months or more, and finishes disgusted, defibrinated, shattered in constitution, low in spirits, and not so well in health as when he commenced!

Apoplexy of the retina is an effusion of blood into the substance proper of the retina. It is extremely rare, and but few cases of it are on record. The rational symptoms are those of sub-retinal apoplexy, or detachment of that structure from sanguineous effusions, with the exception of being sudden and more complete. The physical or ophthalmoscopical signs are, a normal and healthy appearance of the transparent media (the cornea, aqueous and vitreous humors, and crystalline lens); the retina is completely discolored, the optic nerve and macula lutea invisible; the position of the former is only recognizable by the ruptured vessels being there traced. Numerous clots are seen hanging upon the coats of the vessels, and projecting into the vitreous body. Liebrich[1] has detailed a very interesting case of apoplexy of the retina, but space will not permit of its being quoted.

The papilla of the optic nerve is subject to various alterations, discovered by the ophthalmoscope; viz., *hyperæmia*, *anæmia*, *hypertrophy*, *atrophy*, and *prominence*.

With regard to the exploration of the diseases of the papilla, a bi-convex lens is absolutely indispensable. The rational symptoms are altogether negative, indicating nothing more than possibly can be attributed to other intra-ocular lesions. The physical signs are such that, by an ophthalmoscopical examination, an early diagnosis may be made, a judicious treatment given, and a cure effected.

Hyperæmia papilla. (*Vide* Fig. XI., Appendix.) The ophthalmoscope reveals in this pathological condition, a loss of the bright shining whiteness of the normal papilla, which, from an over-development of the vessels, becomes red, varying from a rose-pink tint, to the deepest scarlet. In the less serious congestions, the color is of a light pink, and the papilla is seen as through a gauze

[1] Archiv. Ophth. Graefe, Donders und Arlt, B. I. s. ii. p. 346.

veil; but, in the more serious ones, it is completely hidden by the numerous distended vessels, and its position is only known by the fact, that the vessels spring from, and enter about its centre. In some few cases, however, a small portion of the papilla may be seen through the network of vessels covering it; in others, the vessels surround it in such a manner as to make it appear as if it were scooped out, not unlike the cornea in *chemosis conjunctivæ*. Sometimes the veins are so turgid, that they present a varicose condition, constituting what is known as *varix papillæ*, and *varix retinæ*, by no means rare affections, and readily recognized by pressure upon the ocular globe, which produces a prominence of the vessels, whereby their pulsations may be made visible.

If the disease be attacked before exudations have formed, it generally yields to general and local antiphlogistic measures; but, if the plasma should have done its work, the masonry of nature is not often removed from the spot upon which it has been deposited by the *vis medicatrix*. The exudations consecutive upon a hyperæmia are the real causes which induce a blindness, and in such cases a course of mercury is warrantable, but fails more frequently than otherwise, not from the non-absorbability but from the various relapses, for after one hyperæmia of any portion of the intra-ocular structure there is a tendency to another: the eye, in fact, is in the condition of an exudative crasis, viz: that condition which Rokitansky describes, when the system has a tendency to any peculiar lesion, such as the pneumonic crasis, the febrile crasis, etc. etc.

Always, when there is hyperæmia of the papilla, there is a like condition of the retina; but the latter's being thus affected does not necessarily imply such a one of the former. All of the other intra-ocular lesions before described may be, and sometimes are associated with hyperæmia of the papilla.

Anæmia papillæ is a condition quite the reverse of the preceding, and is characterized by a diminution in the calibre of the vessels, or even their complete absence. The normal color is absent, and there is a marked paleness in the whole of the surrounding structures. Anæmia of the retina is attendant upon anæmia of the papilla, and *vice versâ*.

Hypertrophia papillæ has been observed but once, at least there is only one case on record,[1] and in this case the conditions of the apparatus of vision were healthy, save an increase in the size of

[1] Medico-Chirurgical Review, April, 1855, p. 386.

the papilla, its diameter being about seven lines. "The patient, who was a vigorous man, without any known cause had lost all sensibility to light."

Atrophia papillæ is totally the reverse of the last-named affection, and is a disease known only since the discovery of the ophthalmoscope. It is an infallible symptom of cerebral affection, and the amaurosis which it entails is altogether organic, dependent upon some interference with the nutrition of the optic nerve. In such a condition the ophthalmoscope reveals a most marked diminution in the size of the papilla, which seems shrunk and shrivelled. The retina also partakes slightly of this shrivelled appearance. This atrophy is nothing more or less than a paralysis of the nerve, which may be complete or incomplete. The treatment of this lesion depends upon the cause, and all therapeutics must be directed towards it. It may be congestion, inflammation, tuberculosis, ramollissement, the presence of a tumor, in fact any disease of the brain; and to the treatment of the cause the result of the amaurosis must tend.

Prominence of the papilla is one of the gravest of affections, and as it is beyond the resources of therapeutics or surgery, it is well to be able to diagnosticate it from the beginning, for many reasons above mentioned. The ophthalmoscope shows a shaded ring all around the papillary circumference, owing to its overhanging the choroid. The bloodvessels, which in the normal condition proceed in rather direct lines from the centre of the papilla, in this condition, after reaching its circumference, are bent down, and completely hidden under the margin; they are so abruptly bent as to give the appearance of having been cut away: a line or so from the margin they make their reappearance. Prominence of the papilla is most generally associated with posterior sclero-choroiditis, although the latter is not always met with in conjunction with the former: hyperæmia and anæmia are not unfrequently associated with it. In fact all of the intra-ocular lesions are so apt to be blended together, that it is rather a rarity than otherwise to find a purely uncomplicated case of a lesion of any one of the internal structures of the eye.

The pathological conditions of the choroid, as revealed by the ophthalmoscope, constitute some of the most interesting discoveries in ophthalmology, and the researches instituted by modern investigators upon the subject are worthy the attention not only of the oculist, but of the general pathologist. The affections of the cho-

roid, as classified by the latest authorities, are *choroiditis, and posterior sclero-choroiditis.*

Choroiditis is acute and chronic. The symptoms by which acute choroiditis was recognized prior to the discovery of the ophthalmoscope, or the indications furnished by an inspection of the external portions of the globe were (and are now) as follows: The patient complains of a severe shooting and pulsating pain within the eye and the surrounding parts on that side of the head: this pain intermits, and is very much exaggerated during the night. Photophobia is one of the earliest and most constant symptoms, as well as excessive lachrymation. Photopsia or spontaneous flashes of light are frequent, for the patient complains of such flashes of brilliant yellowish and reddish light, even when in obscurity. All motions, either of the eyeball or of the body, are attended with acute pain. The ocular globe, felt through the lids, is as hard as rock, and the slightest touch thereon produces violent pain. If it be possible to obtain a view of the eye in such a condition, the sub-conjunctival and sclerotical vessels are found to be slightly injected, the larger exterior vessels anastomosing around the cornea, and (according to Mackenzie) are in a state of passive congestion. The whole white of the eye presents a dirty yellowish aspect. The cornea is frequently cloudy and hazy, and sometimes rough, and the edge presents a milky bluish aspect, owing to the overlapping of the sclerotica. The iris is at first in a state of contraction, presenting a dirty green color, but soon assumes a slate color, and is permanently dilated, often misshapen and ragged. In acute choroiditis the ophthalmoscope reveals a great deal, but to make a thorough examination it is absolutely necessary to chloroform the patient, as the involuntary contraction of the palpebral muscles, and the intense photophobia, render it impossible without the aid of anæsthetics. The retina rarely, if ever, escapes being complicated with the inflamed choroid; hence, in an ophthalmoscopical examination the appearances are pretty much the same as in retinitis or hyperæmia of the retina, with the exception of a very peculiar rolling, as it were, of the pigmentum into irregular bundles, which completely destroys the before-mentioned radiated arrangement of that substance. The treatment in these instances requires the most active antiphlogistic measures and regimen, conjoined with opiates, and an excito-secretory expectant use of remedies.

The *non-ophthalmoscopical symptoms of chronic choroiditis*, such as are furnished by the feelings of the patient, and an examination of the external tunics of the eye, are as follows: The lesion makes its appearance slowly and step by step: a dull heavy pain is felt in the eye and circumorbital regions, photopsia, slight photophobia, and iridescent vision daily become of a more alarming character. The sub-conjunctival vessels are injected, and become very tortuous and varicose, the iris loses its normal appearance and assumes a dirty lead color. Later the sclerotic becomes thinner by interstitial absorption, and presents a blue or even dark color: in certain spots it is much thinner than the surrounding tissue, and the choroid bulges forward, forming incomplete hernias of that membrane, true (so called) posterior staphyloma of the choroid. The eyeball becomes harder as the disease advances, which is just the reverse of what takes place in acute chronic retinitis. To sum up in a few words, the symptoms offered by chronic choroiditis, are the same as in acute choroiditis, being, however, of a milder type.

Conditions of the Parts in Chronic Choroiditis as seen by the Ophthalmoscope.—After having examined the transparent media, as should always be done prior to the deep research, the entrance of the optic nerve is sought for, as well as the yellow spot of Sœmmering, which being found, the rest of the examination is made with a greater degree of certainty. And as the congestion or inflammation is of an active or passive character, so are the appearances presented by the parts, more particularly as regards the bloodvessels than the other structures. In an active or sthenic congestion the choroid is of a very bright red color, approaching to a vermilion or scarlet tint—the arteries and veins upon the retina numerous, following the normal disposition and maintaining their normal size. The transparent media assume a very brilliant appearance, owing to the momentum of the red rays of light: frequently the lens is affected with undulating and transverse striæ, which are not cataract-striæ, as they disappear if the choroiditis be ameliorated. There is always a slight maceration of the pigmentum in this form of choroiditis. In the passive or asthenic condition, the choroid is of a dirty dark red, approaching to a leaden hue, and is covered by numerous spots of brownish red pigmentum. Upon the retina numerous swollen, turgid and tortuous veins are seen, whereas there are very few small and thin arteries. The crystalline lens and vitreous body are muddy, often glaucomatous, and in the latter, shreds of detached retina and pigment cells are seen floating. These pigment cells

floating in the vitreous body constitute one of the characters of *maceration of the pigmentum.*

This condition is readily understood by its name: it consists of a detachment of a greater or less quantity of pigmentum, and a derangement of the normal radiated appearance of that substance: there is a certain quantity rolled as it were upon itself, which presents a brownish black appearance with ragged edges. Wherever there is a detachment of this pigment, the white sclerotic is seen through the somewhat hazy retina, presenting white patches which reflect the light. This maceration of the pigmentum at once explains the photopsia and other peculiar symptoms with regard to deranged sensation, as referred by the patient. Thus a confusion of images is explained by there being a reflection of light from the retina, which has no pigmentum behind it to absorb a superabundance of the luminous rays, which are reflected in various ways upon different parts of the retina, thereby producing a confusion of images. Again where the pigmentum is detached as in the last instance, the retina is extremely sensitive, and is affected by a very moderate light, hence the photopsia and iridescent vision. This exquisite sensitiveness of the retina, finishes by a complete anæsthesia of such parts as are deprived of pigmentum. One of the most dreaded results of a lesion of the choroid is an exudative inflammation, which explains the anæsthesia in question; for, wherever there is a maceration of the pigmentum, the exudation takes place, as it were, by election, and pressing upon the retina from behind, causes it to bulge forward into the vitreous body. This pressure being constant, generally ends by a complete change in the structure of the retina, causing it to become opaque or hazy from an effusion of lymph, or the contrary takes place and the retina bursts, allowing the pigment granules and cells to enter the substance of the vitreous body. This latter complication is more frequently met with in passive or asthenic inflammation than in the other conditions of active or sthenic choroiditis. The explanation of the entrance of these pigment particles into the vitreous body, at once accounts for the *muscæ volitantes* so frequently met with, as symptomatic of *diseased brain*, and which, combined with the other symptoms of choroiditis would lead us to anticipate a lesion rather more fatal to life than eye disease. It is very, nay absolutely necessary, in choroiditis to use the ophthalmoscope in the formation of a diagnosis and prognosis; and, it would be useless for us to reiterate what we have frequently before advanced,

viz., the baneful results of a mistaken diagnosis, and of the misapprehension of brain disease for eye disease, and *vice versa*. There yet remains to be described an affection, which, in point of frequency of occurrence, and interest to the special and general pathologist, is worthy of the greatest attention, viz:—

Posterior Sclero-choroiditis.—Graefe,[1] of Berlin, was the first to call attention to this disease, and as such deserves the thanks of the profession, not only for his Herculean labors in this field, but also for his manifold works in the ophthalmological science. His statistics, with regard to the disease in question, have been confirmed by Arlt, of Prague, Donders, of Utrecht, and Desmarres, of Paris. Graefe found that out of one thousand cases of so-called amblyopia, four hundred and twenty (42 per cent.) were connected with a posterior sclero-choroiditis. Another remarkable point in connection with the disease, is that short-sighted persons more particularly labor under this disease than any other class. Graefe states that myopics who use concave glasses ranging from two to six (German enumeration), nine out of every ten (90 per cent.) possess this lesion. The writer would state that he saw many such cases at the *cliniques* of Desmarres, and all, with but one exception, were myopic. Since the discovery of the disease by the ophthalmoscope, we are enabled, without this instrument, to at least suspect the presence of the disease through subjective phenomena. Thus, a patient presents himself, complaining of either amblyopia or amaurosis, which is symptomatic of what? A farther interrogation reveals that myopia has been constant from the beginning, or at least the short-sightedness was the first symptom through which the disease was first noticed, and that it increases; that the examination of near and small objects becomes painful, and finally, as the disease becomes more developed, the use of concave glasses is altogether hurtful, and becomes so much so that they have to be thrown aside. Photopsia, photophobia, iridescent vision, circumorbital, and orbital pains, develop themselves as described above, when speaking of acute and chronic choroiditis. What, then, is the nature of this disease? According to Graefe, who had, up to July, 1857, examined over one thousand cases upon the living and dead, it consists of a co-existing inflammation, involving at the same time the sclerotic and the choroid at the posterior portion of the orbit, hence his naming it *posterior* sclero-choroiditis. It might be objected that

[1] Archiv. Ophthal., Graefe, Donders, und Arlt, b. i. s. 390.

the word inflammation is a misnomer, but the hyperæmia of the choroid, the alterations in the pigmentary secretion, the obliteration of the ciliary vessels discovered upon a *post-mortem* examination, the atrophy of the posterior portions of the choroid, the nutritive derangements of the vitreous body, frequently in a state of fluidity, the frequently observed complications of hemorrhages, and finally, the happy results obtained from an antiphlogistic plan of treatment, would, *per exclusionem*, induce us to believe that the disease was of an inflammatory nature.

The complications of the disease are many, the most noted of which is a rupture of the choroidean vessels, producing a sanguineous effusion under the retina. And the writer believes that the extension of inflammation from the sclerotic and choroid has less to do with the consecutive alterations than the effused blood. For, to this effusion, as we have above seen, are referable detachment, hyperæmia, and anæsthesia of the retina, foreign and floating substances in the vitreous body, cataract and other striæ of the lens, and, in a word, all the diseases before mentioned as attacking the various structures of the eye. At the same time he would not pretend to say that all of these complications could not, and are not produced by an extension of inflammation from the affected tissues, as he well knows that such is frequently the case, but he believes the effused *or* extravasated blood to be the principal or chief *casus*.

The ophthalmoscope reveals the pathological conditions upon which the so-called amblyopias and amauroses (to which the disease in question is referable) are dependent, and which are as follows: The bottom of the eye is more or less white, according as the disease is more or less extensive; this white patch is owing to a maceration of the pigmentum: it is irregular in shape, with fringed or ragged borders, if it be of a size greater than the papilla of the optic nerve. This brilliant white patch is the sclerotic made visible by the maceration of the pigmentum of the choroid, and were it not for the vessels seen furrowing the transparent retina, the presence of that membrane would be altogether ignored. These vessels are so marked, so well defined upon the white ground of the sclerotic, that they seem to be enlarged and turgid from a hyperæmic condition; but this is not the case, as they are really so small that they almost become lost upon that portion of the retina, where the choroid remains intact. A very peculiar deception exists in this disease, viz: the appearance as if the white patch were projecting or prominent, whereas in reality it is just the reverse, presenting

a concavity forwards.[1] This condition of affairs is very deceptive and tends to an incorrect diagnosis: for one readily might mistake a maceration of the pigmentum for a plastic exudation, and *vice versâ*. When the disease first makes its appearance it is with difficulty recognized, as it most frequently appears at the juncture of the choroid and the papilla of the optic nerve, and may be readily confounded with the latter. As the disease advances, the size of the white patch increases, and it is particularly at this stage that it may be confounded with an hypertrophied papilla presenting ragged outlines; but a careful examination displays the normal papilla not being altered in size or appearance, and what was presumed to be a disorganized papilla proves to be the maceration of the pigmentum.

As the disease advances the patch enlarges, the outlines become more fringed and ragged, the anæsthesia of the retina increases, and the general visional functions more deranged. Having sketched posterior sclero-choroiditis as regards its pathology, it would be well to examine it as regards its connection with myopia. The frequency of the disease conjoined with myopia led Graefe to the conclusion, that the latter defect consisted in an enlargement of the antero-posterior axis of the ocular globe; *post-mortem* examinations having always revealed such a condition, and always when myopia and the disease in question were co-existent. Graefe's conclusions were fallacious, and he reasoned by a vicious circle: thus, in certain conditions of a diseased eye myopia exists, the eye in these conditions is lengthened antero-posteriorly, therefore myopia depends upon the lengthened axis. Graefe, however, forgot that myopia exists without posterior sclero-choroiditis, and *vice versa;* and, if they can exist separately, they are in no wise absolutely dependent one upon the other. Besides, if posterior sclero-choroiditis be successfully treated, even in the earlier stages, if myopia had previously existed, the cure of the disease does not remedy the defect. From these facts the writer is led to believe that myopia and posterior sclero-choroiditis are frequently complicated and connected, but, that in the present condition of ophthalmoscopical science, it would be extremely difficult to say that one depended

[1] It should be borne in mind that in an ophthalmoscopical examination of the bottom of the eye, all white surfaces or spots appear as if in relief, and all dark or black ones seem to be scooped out or excavated. This condition of affairs is the rule, the reverse is the exception.

this paper concerning myopia explains the defect in the only rational manner, as far as observation has been able to determine.

The *Entozoa* as yet met with in the eye are few, and of these only one species has been seen posterior to the lens, or has been discovered by the ophthalmoscope, viz., the *Cysticercus telæ cellulosæ*. The other entozoa which were seen by the naked eye of the observer, were the *Filaria Medinensis* (dranunculus, Guinea worm), a species of entozoa found in the tropical regions of Africa, two cases of which are reported by Dr. Loney, and one by Mongin.[1] In Dr. Loney's cases, the worms were extracted alive from the inner circumference of the cornea, and each measured two inches in length.

Filaria oculi humani.—Dr. Nordman, of Odessa, detected in a lens extracted by Graefe, Sr., two very delicate and small rings, which upon a microscopical examination proved to be filariæ.[2]

Monostoma oculi humani.—Dr. Nordman reports the discovery of eight specimens of this species in an extracted lens.[3]

Distoma oculi humani.—Gescheidt and Ammon found four of these entozoa in an extracted lens.[4]

Echino-coccus homini.—This entozoon has been frequently met with in the areolar tissue surrounding the orbit; but Mr. Bowman[5] relates two cases of its being found within the orbit. Mr. Lawrence, in his excellent treatise on eye diseases, reports one case of its occurring within the ocular globe.

The *Cysticercus telæ cellulosæ* is the entozoon most frequently met with as occurring intra-ocularly. Mackenzie[6] reviews the subject, or rather reiterates the cases of its having been found, A, in the areolar tissue of the eyelids; B, under the conjunctiva; C, in the anterior chamber; and, D, in the cornea.

Graefe,[7] however, was the first to describe the presence of the entozoon within the deep structures, such as in the vitreous body and upon the retina. As to the knowledge of the presence of

[1] Mongin, Journal de Médecine de Paris, 1770; tome xxxii. p. 338.

[2] Mikrographische Beiträge zur Naturgeschichte der wirbellosen. Thiere. Berlin, 1832, H. i. p. 7.

[3] Ibid. H. ii. p. 9.

[4] Zeitschrift für die Ophthalmologie, vol. iii. p. 75. Dresden, 1833.

[5] Medico-Chirurgical Transactions, vol. xvii. p. 48. London, 1831.

[6] Mackenzie, *loc. cit.*

[7] Archiv. Ophthal., *loc. cit.*, t. i. 2te part, p. 343—t. ii. 1te part, p. 263—t. i. 1te part, pp. 452–463.

these entozoa, it does not in the least contribute to the therapeutics of ophthalmology, save in a negative manner, viz., by preventing the use of medicine, and by assuring the patient that all artificial means for the removal of the offending body are perfectly useless. In a purely scientific point of view, the discovery of the presence within the eye of a living animal is in the highest degree interesting, as it involves the various questions of generation.

The rational symptoms presented by the appearance of a cysticercus are not at all conclusive, and are nothing more than what is common to any so called amblyopia.

Ophthalmoscopical examinations indicate the presence of the entozoon in the vitreous body and upon the retina.

A cysticercus of the vitreous body is readily recognized when it is in a state of quiescence, and also when the eye is in a similar condition: it presents the following characteristics: A bluish or greenish-white tumor of a spherical form, obstructing the view of, or at least interfering with the regular position of the retinal vessels. The tumor is formed of a membrane of envelop which constantly surrounds the entozoon, and through which the characteristic form and movements of the cysticercus are readily recognizable. Within the sac enveloping it, the various portions of the entozoon may be distinguished, at least the outlines: thus, in a case seen by the writer at the *klinik* of Graefe, the head seemed adherent to an exuded false membrane within the vitreous, behind which there was a very perceptible narrowing, corresponding to the neck, which was about a line in length. From the base of the neck, the body began to increase, presenting rather a pear-shaped appearance of about three and a half lines in length, of a pearl-gray color, and was folded upon itself rather like the plaits of a shirt bosom.

The complications are always numerous, and may be any one or all of the diseases before described. The most frequent lesion, however, met with as a complication, is a maceration of the pigmentum. Cysticercus of the retina presents the same extra-ocular phenomena as does that of the vitreous body, always being in more exaggerate conditions.

We have thus finished a sketch of the various lesions presented by means of the ophthalmoscope, and although by it this paper is brought to a close, it is by no means so complete as might be desired; for many points of interest have been but glanced at, and others entirely omitted: the general therapeutics indicated in some, and the particular treatment of each left out. Why such has been

the case is readily understood, when we say, that had we given to each particular lesion its proper therapeutical consideration, this essay might have assumed such formidable dimensions, as to be totally devoid of any merit save verbosity. As we merely proposed to consider some of the anomalies as revealed by the ophthalmoscope, it would be inappropriate to say aught more, and having accomplished our task, we make our bow, hoping it has not been a fruitless one.

APPENDIX.

FIG. I. Normal eye, as presented by Desmarres's ophthalmoscope. The subject from whom the figure was drawn is a brunette of a marked type. The figure is magnified one and a half diameters. *A*. Papilla of the optic nerve. *B*. Arteria centralis retinæ. *C* is the accompanying vein (vena centralis retinæ). *D*, *D*, *D*. Spreading out or concavity of the retina, through which the bright shining choroid is visible, as the radiated (folds or deposits) structure of the pigmentum nigrum of the choroid.

FIG. II. Jäger denominates this figure as *amblyopia hæmorrhoidalis* simply. *A*. Optic nerve slightly tinged yellowish. *B*. The spot whence spring the artery and vein, covered by an exudation of plasma. *C*. Extravasations of blood.

In the case seen by the writer, and whose eye presented an almost analogous condition, was a *hyperæmia papillæ* conjoined to chronic choroiditis. In this case, however, there was no exudation covering the origin of the vein and nerve.

FIG. III. Amblyopia of a mild form, in a boy fourteen years of age. Although Jäger denominates the pathological conditions presented by the figure in question as *amblyopia*, it is most undoubtedly the consequence of hyperæmia of the retina and of the papilla, conjoined to a slight choroiditis. The spots upon the papilla being exudations, and the slight deposition of pigmentum above it indicating the derangement of the choroid. *A*. Papilla of the optic nerve, upon which are numerous bluish-gray exudation spots. *B*. The origin of the artery and vein. *C*, *C*. Darker parts of the retina, owing to the deeper color of the choroid: it must be borne in mind that the circumference of all of the figures is as far forward as the *ora serrata*, and that they should present a concavity. *D*. Radiated appearance of the pigmentum, very indistinctly represented, owing to the condition of the parts.

FIG. IV. *Amaurosis* (*congestiva*) *completa* of Jäger, chronic, of two years' standing. This figure is given because of the apparent contradiction

in the appearance of pathological conditions, for in the analogous case seen by the writer, the disease was amaurosis from anæmia of the retina. In all probability there had been some congestion previous to the writer's having made any examination, and the presence of the pigment deposits would justify such a supposition. In the writer's case, the vessels were not so large as is represented in the figure. (Vide *anæmia retinæ* in the essay.) *A*. Papilla of the optic nerve. *B*. Spot where the vessels pass in and out. *C*. Deposit of pigmentum: a smaller deposit is seen on the inner side. *D*, *D*. Radiated arrangement of the pigmentum.

Fig. V. *Amaurosis completa* of Jäger, chronic, of nine months' standing. This is undoubtedly a case of hyperæmia of the retina, in fact a very similar one to that of Fig. IV., as reported by Jäger. The letters point to similar structures, and are the same as in Fig. IV. In the analogous case, as seen by the writer, the structures, as seen by means of the ophthalmoscope, presented evidences of an existing retinitis, chronic in nature, and the remains of what was once a choroiditis of a mild type, the pigment deposits undoubtedly showing such a condition.

Fig. VI. After Jäger, who describes it as "*amaurosis completa* of three months' standing, in a female aged twenty-six years. The retina moderately yellowish-red, the optic nerve uniformly yellowish-white. Upon the central artery, and scattered throughout the substance of the retina, are small, rounded, and oval whitish exudations." This account is but meagre, and did we not know the results of hyperæmia of the papilla and the retina, we would be completely at a loss to know the cause of the amaurosis, which undoubtedly was occasioned by the lesions in question. *A*. Papilla. *B*. Origin of bloodvessels. *C*. Pigment folds. *D*. Exudation spots, the result of a prior inflammation.

Fig. VII. Jäger describes this as a "mild amblyopia, resulting from intoxication in a man forty-five years of age. It was of four weeks' standing, and there was a marked development of vessels, and more or less number of extravasations of a light and dark color, partially enveloping the optic nerve. Yellowish exudations are seen upon the retina at *C*."

Jäger's case was but a mild acute amblyopia; the writer has seen several presenting similar appearances, which were completely amaurotic, being true cases of hyperæmia of the papilla and retina. Instead of there being straw-colored exudations upon the retina there were light-red exudations, apparently formed by arterial extravasations, as at *C* in the figure. This figure was drawn from Jäger, but colored to represent the writer's case. *A*. Papilla of the optic nerve partially surrounded by hypervascular retina. *B*. Venous extravasation. *C*. Arterial extravasation. *D*. Pigment folds.

FIG. VIII. Jäger describes this to be a case of "*amaurosis completa* (of twenty years' standing amblyopia, but five of complete amaurosis). Optic nerve and retina of a uniform orange color. *C, C, C,* are straw-colored arteries of the choroid. *B.* Black pigment spots about to undergo maceration." The writer has somewhat altered the figure by coloring it to illustrate, almost faithfully, a purely uncomplicated case of choroiditis, which was completely cured by antiphlogistic measures. The case in question presented the symptoms described under the head of choroiditis in the context. Two veins are seen traversing the papilla, which were the only indications of the retina partaking of the affection. The arteries mentioned by Jäger as being straw-colored, were in this instance of the bright-red hue represented in the figure. Numerous streaks of pigment are seen to radiate from the optic nerve, and are very characteristic of the choroid's having been once affected, or is subjected to some alteration at the moment of examination.

FIG. IX. Jäger describes this case as *amaurosis arthritica* (*glaucomatosa*). The writer gives the figure, and colors it to represent as nearly as possible the appearance of the fundus of the membrane of envelop surrounding a *cysticercus* of the papilla. Jäger's description sheds no light upon the case, and the writer would not hazard an opinion as to the true pathological conditions of the eye, as *glaucomatosa* might mean sundry various ones.

It should be borne in mind that none of the figures are colored by Jäger, and that the writer reproduces them almost as an entire new series. Also, it should be remembered that the coloring has not been altogether in accordance with Jäger's descriptions.

FIG. X. Appearances presented by the ophthalmoscope in *albuminuria.*

A. Papilla of the optic nerve slightly tinged with yellow, owing to a deposit of fat globules.

B. Central artery and vein.

b, b, b, b. Pigment spots characteristic of the disease.

FIG. XI. *Hyperæmia papillæ et retinæ.* This case is the one referred to in the context as being one of *spurious color-blindness.* In an uncomplicated case of *hyperæmia retinæ,* there is no network of vessels seen upon the papilla, as in this instance. The two diseases are represented together for two reasons: firstly, because in the case of color-blindness in question they co-existed, and secondly, *hyperæmia papillæ* never exists without *hyperæmia retinæ.* The individual who presented himself, from whose eye the figure was drawn, complained of being unable to distinguish colors by that affected eye (the right); that full greens and red were of a

gray, and all others, with the exception of lemon-yellow, were black; and that such a condition existed but about fifteen minutes after any excitement, such as a full meal, etc. These phenomena are readily explained upon the general principles of vision, and are referable to the turgid condition of the vessels during a state of excitement. The patient had for many years complained of amblyopia of that eye.

A. Papilla covered by a network of vessels.

b, b. New crop of veins developed by the inflammation in question.

c, c. Arteries developed from the same cause.

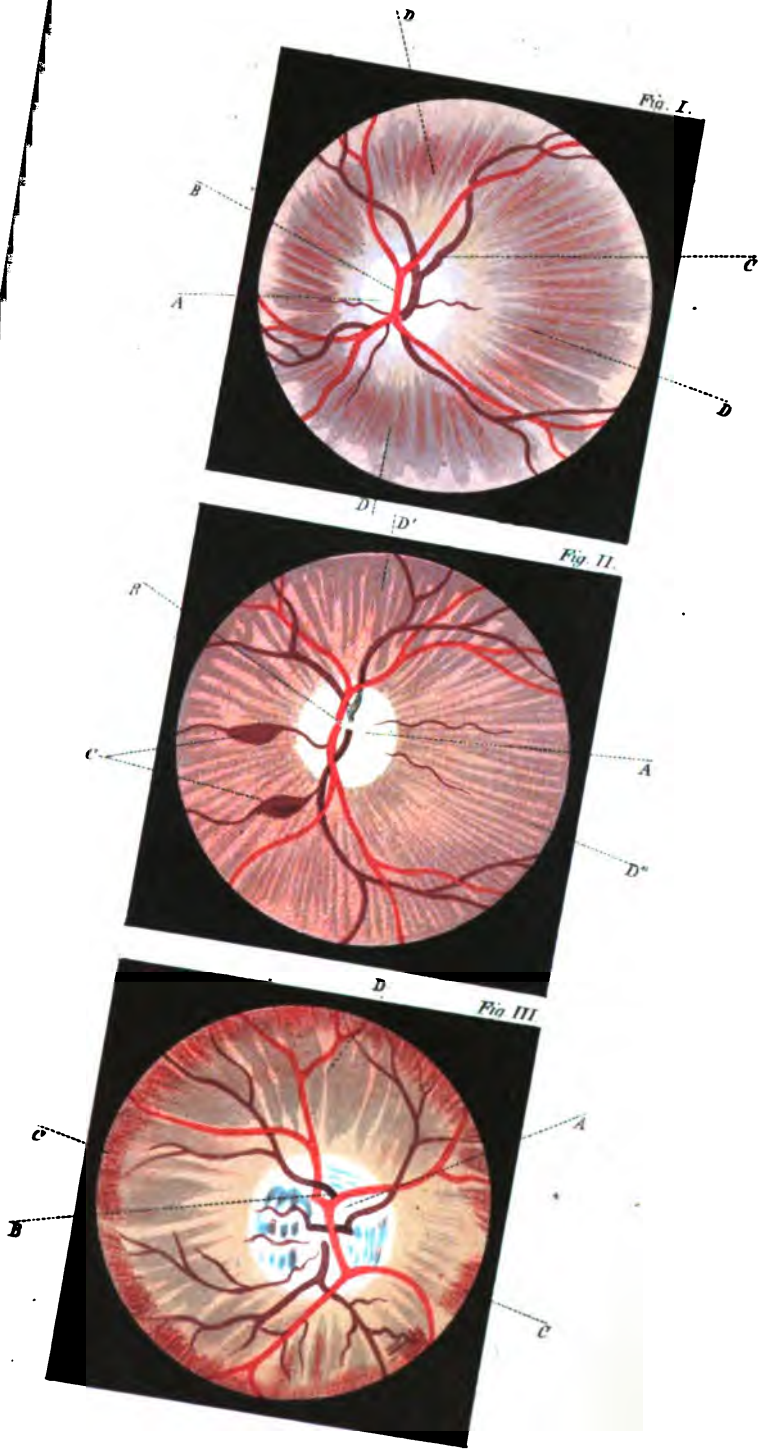


Fig. I.
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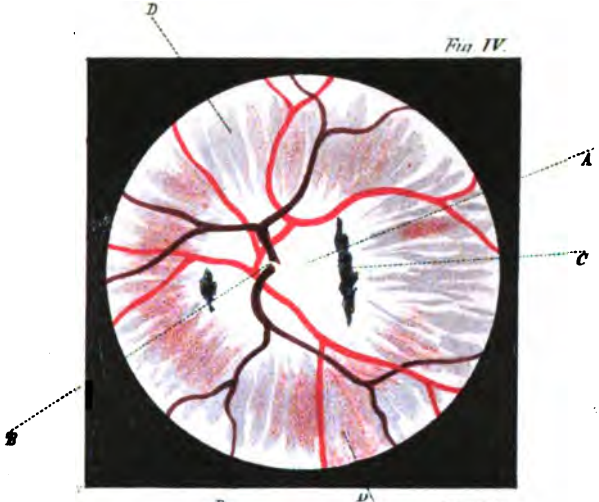
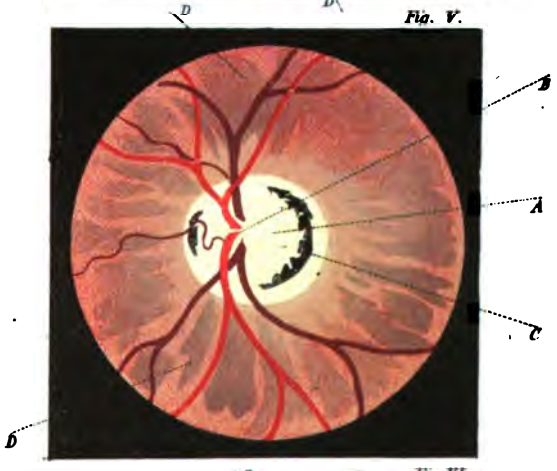
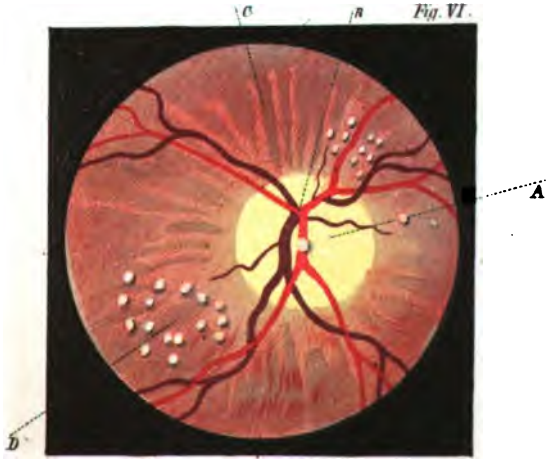






(Fig. II, III, IV, V, VI, VII, VIII & IX, are after Jäger, but colored and verified by the Writer).

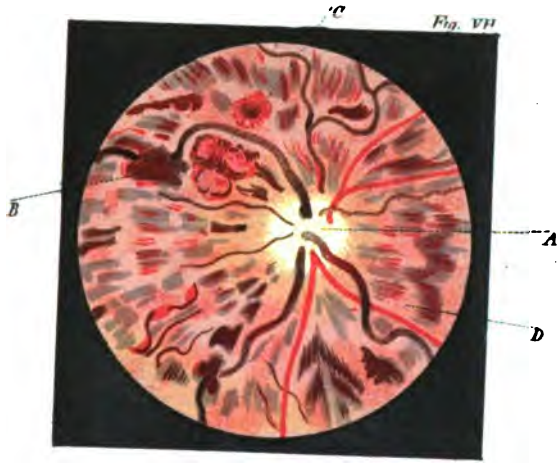


Fig. VII

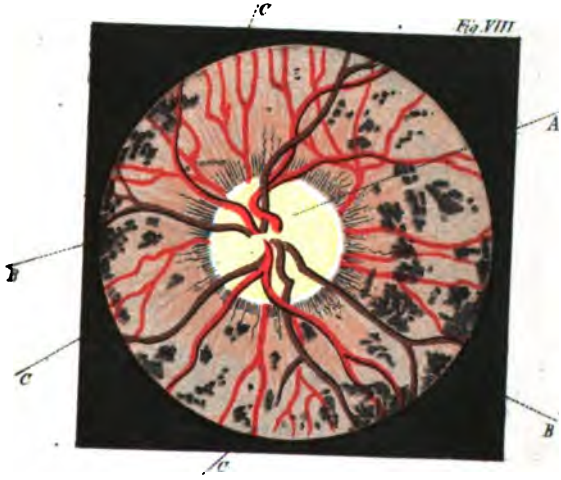


Fig. VIII

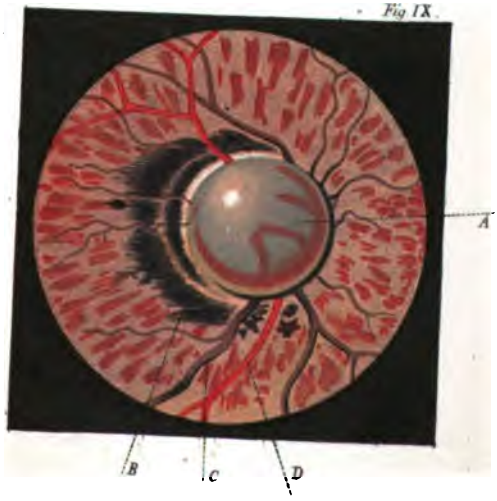
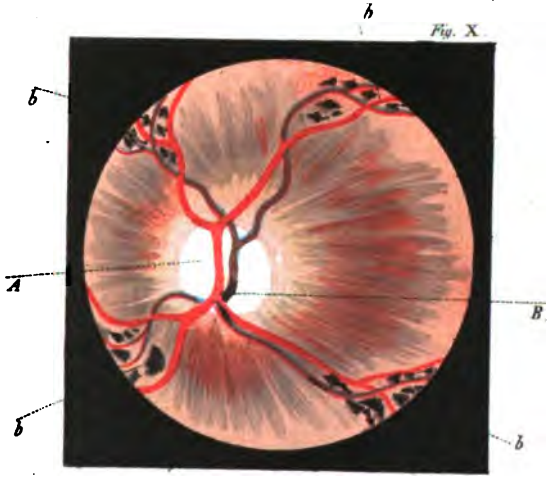


Fig. IX.



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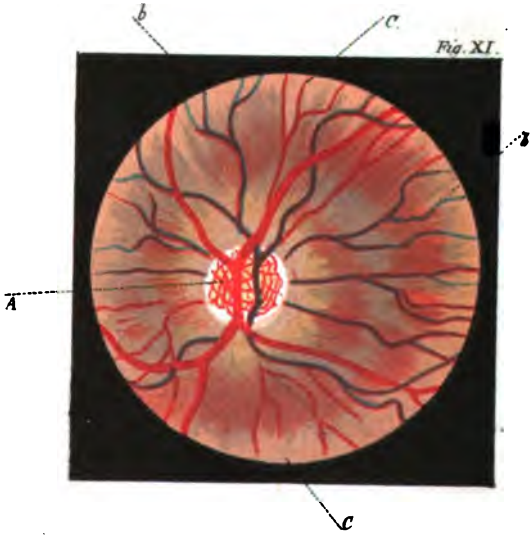

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PLAN OF ORGANIZATION

OF THE

AMERICAN MEDICAL ASSOCIATION.

PLAN OF ORGANIZATION.[1]

REGULATIONS.

I. TITLE OF THE ASSOCIATION.

THIS institution shall be known and distinguished by the name and title of "THE AMERICAN MEDICAL ASSOCIATION."

II. MEMBERS.

The members of this institution shall collectively represent and have cognizance of the common interests of the medical profession in every part of the United States; and shall hold their appointment to membership either as delegates from local institutions, as members by invitation, or as permanent members.

The Delegates shall receive the appointment from permanently organized medical societies, medical colleges, hospitals, lunatic asylums, and other permanently organized medical institutions of good standing in the United States, and from the American Medical Society of Paris. Each delegate shall hold his appointment for one year, and until another is appointed to succeed him, and shall participate in all the business and affairs of the Association.

Each local society shall have the privilege of sending to the Association one delegate for every ten of its regular resident members, and one for every additional fraction of more than half

[1] In accordance with the following resolution, passed at the session in Washington, the Committee of Publication have introduced into the Plan of Organization all the resolutions adopted at the various meetings for the government of the Association. Those for which there was no appropriate place have been appended.

Resolved, That the Committee on Publication be instructed to collect all the by-laws and resolutions which have not been rescinded through the different volumes of the *Transactions;* to arrange them under their respective heads, and append the same to the Constitution. (See page 50.)

of this number. The faculty of every regular constituted medical college, or chartered school of medicine, shall have the privilege of sending two delegates. The professional staff of every chartered or municipal hospital containing a hundred inmates or more, shall have the privilege of sending two delegates; and every other permanently organized medical institution of good standing shall have the privilege of sending one delegate.

The sum of three dollars shall be assessed, annually, upon each of the delegates to the sessions of the Association, as well as upon each of its permanent members, for the purpose of raising a fund to defray the expenses of printing the *Transactions*. The payment of this assessment shall be required of the delegates and members in attendance upon the sessions of the Association, previously to their taking their seats and participating in the business of the session; and of all others on or before the first of September in each year.

Each delegate and member who has paid his annual assessment, in accordance with the terms of the above resolution, shall be entitled to receive a copy of the printed *Transactions* of the session.

No State or local society shall be entitled to representation in this Association, that has not adopted its Code of Ethics.

No State or local society that has intentionally violated or disregarded any article or clause in the Code of Ethics, shall any longer be entitled to representation in this body.

No organization or institution, entitled to representation in this Association, shall be considered in good standing, which has not adopted its Code of Ethics.

Delegates representing the medical staffs of the United States Army and Navy, shall be appointed by the Chiefs of the Army and Navy Medical Bureaux. The number of delegates so appointed shall be four from the army medical officers, and an equal number from the navy medical officers.

The Members by Invitation shall consist of practitioners of reputable standing, from sections of the United States not otherwise represented at the meeting. They shall receive their appointment by invitation of the meeting, after an introduction from any of the members present, or from any of the absent permanent members. They shall hold their connection with the Association until the close of the annual session at which they are received; and shall be entitled to participate in all its affairs, as in the case of delegates.

No assessment whatever shall be made against members by invitation, but they also shall be entitled to a copy of the printed *Transactions*, by paying the sum assessed upon delegates in attendance.

The Permanent Members shall consist of all those who have served in the capacity of delegates, and of such other members as may receive the appointment by unanimous vote.

No permanent member who is not present at a meeting of the Association, shall be required to pay the annual assessment; but no such permanent member shall be entitled to receive a copy of the printed *Transactions* unless he pay into the treasury a sum not less than the annual assessment paid by the delegates and permanent members in attendance; all the names of permanent members that have been left off the published list, shall be reinserted therein in the next volume of *Transactions*.

Permanent members shall at all times be entitled to attend the meetings, and participate in the affairs of the Association, so long as they shall continue to conform to its regulations, but without the right of voting; and, when not in attendance, they shall be authorized to grant letters of introduction to reputable practitioners of medicine residing in their vicinity, who may wish to participate in the business of the meetings, as provided for members by invitation.

Every member elect, prior to the permanent organization of the annual meeting, or before voting on any question after the meeting has been organized, must sign these regulations, inscribing his name and address in full, specifying in what capacity he attends, and, if a delegate, the title of the institution from which he has received his appointment.

No one shall be permitted to address the Association, except he shall have first given his name and residence, which shall be distinctly announced from the Chair, and the member be required to go forward and speak from the stand, and not more than ten minutes at one time.

It is the duty of every member of this Association, who learns that any existing medical school departs from the published conditions of graduation, to report the fact at the annual meetings; and that, on proof of the fact, such school shall be deprived of its representation in this body.

III. MEETINGS.

The regular meetings of the Association shall be held annually, and commence on the first Tuesday in May. The place of meeting shall never be the same for any two years in succession, and shall be determined for each next succeeding year by vote of the Association.

IV. OFFICERS.

The officers of the Association shall be a President, four Vice-Presidents, two Secretaries, and a Treasurer. They shall be nominated by a special committee of one member from each State represented at the meeting, and shall be elected by vote on a general ticket. Each officer shall hold his appointment for one year, and until another is elected to succeed him.

The President shall preside at the meetings, preserve order and decorum in debate, give a casting vote when necessary, and perform all the other duties that custom and parliamentary usage may require.

The President shall be authorized annually to appoint delegates to represent this Association at the meetings of the British Association, the American Medical Society at Paris, and such other scientific bodies in Europe as may be affiliated with us.

The Vice-Presidents, when called upon, shall assist the President in the performance of his duties, and, during the absence, or at the request of the President, one of them shall officiate in his place.

The Secretaries shall record the minutes, and authenticate the proceedings, give due notice of the time and place of each next ensuing annual meeting, and serve as members of the Committee of Publication. The Secretary first in nomination shall also preserve the archives and unpublished transactions of the Association.

The Treasurer shall have the immediate charge and management of the funds and property of the Association. He shall be a member of the Committee of Publication, to which committee he shall give bonds for the safe keeping, and proper use and disposal of his trust. And through the same committee he shall present his accounts, duly authenticated, at every regular meeting.

V. STANDING COMMITTEES.

The following standing committees, shall be organized at every annual meeting, for preparing, arranging, and expediting business for each next ensuing year, and for carrying into effect the orders of the Association not otherwise assigned—namely, a Committee of Arrangements and a Committee of Publication.

The Committee of Arrangements shall, if no sufficient reasons prevent, be mainly composed of seven members residing in the place at which the Association is to hold its next annual meeting; and shall be required to provide suitable accommodations for the meeting, to verify and report upon the credentials of membership, to receive and announce all essays and memoirs voluntarily communicated, either by members of the Association, or by others through them, and to determine the order in which such papers are to be read and considered.

The Committee of Publication, of which the Secretaries and Treasurer must constitute a part, shall have charge of preparing for the press, and of publishing and distributing such of the proceedings, transactions, and memoirs of the Association, as may be ordered to be published. The six members of this Committee, who have not the immediate management of the funds, shall also, in their own names, as agents for the Association, hold the bond of the Treasurer for the faithful execution of his office, and shall annually audit and authenticate his accounts, and present a statement of the same in the annual report of the Committee; which report shall specify the character and cost of the publications of the Association during the year, the number of copies still at the disposal of the meeting, the funds on hand for further operations, and the probable amount of the assessment to be laid on each member of the Association for covering its annual expenditures.

The Committee of Publication shall be instructed to print, conspicuously, at the beginning of the forthcoming volume of the *Transactions*, the following disclaimer, viz: The American Medical Association, although formally accepting and publishing the reports of the various standing committees, holds itself wholly irresponsible for the opinions, theories, or criticisms therein contained, except when so decided by special resolution.

The Committee of Publication shall have power to furnish the chairmen of committees on epidemics with extra copies of their

reports, respectively, at the expense of the Association—the said extra copies not to exceed one hundred.

It shall be the duty of the Publication Committee to append to each volume of the *Transactions*, hereafter published, a copy of the Constitution of the Association.

Every paper received by this Association and ordered to be published, and all plates or other means of illustration, shall be considered the exclusive property of the Association, and shall be published and sold for the exclusive benefit of the Association.

No report or other paper shall be entitled to publication in the volume for the year in which it shall be presented to the Association, unless it be placed in the hands of the Committee of Publication on or before the first of June.

The Committee of Publication shall be instructed to append the Code of Ethics of the American Medical Association to each volume of its annual *Transactions*.

It shall be the duty of the Committee of Publication to fix the price at which the printed *Transactions* of each session will be furnished to others than delegates and members; provided, that in no case shall the said price be less than three dollars.

The Committee on Prize Essays.—A committee of five members shall be appointed, to be called the Committee on Prize Essays, whose duty it shall be, in the interval between the present and the next succeeding sessions, to receive papers upon any subject, from any persons who may choose to send them, to decide upon the merits of these papers, and to select for presentation to the Association, at its next session, such as they may deem worthy of being thus presented.

The Committee on Prize Essays shall have power to form such regulations as to the mode in which the papers are to be presented, and as to the observing of secrecy, as they may think proper.

The selection of the members of this committee shall be referred to the Nominating Committee, whose duty it will be to appoint the chairmen of the several special committees, as above directed, with this restriction, that the individuals composing it shall reside in the same neighborhood.

Two prizes of one hundred dollars each shall be awarded to the best two volunteer communications reported on favorably by the Committee, and directed by the Association to be published.

All voluntary communications hereafter presented to the Association, shall be referred to a special committee of ——, to be ap-

pointed by the President on the first day of each annual meeting, whose duty it shall be to examine such communications, and report upon the propriety of the presentation and reference to the Committee of Publication.

Special committees on *Medical Education*, and *Medical Literature*, shall be appointed, consisting each of five members, and the Nominating Committee shall be instructed to nominate such committees to the Association.

A standing committee shall be appointed by this Association to procure memorials of the eminent and worthy dead among the distinguished physicians of our country, and present them to this Association for publication in their *Transactions*.

A standing committee of ——— members shall be appointed by this Association, on the subject of Insanity, as it prevails in this country, including its causation—as hereditary transmission; educational influences—physical and moral, social and political institutions, &c.; its forms and complications; curability; means of prevention, &c.

VI. FUNDS AND APPROPRIATIONS.

Funds shall be raised by the Association for meeting its current expenses and awards from year to year but never with the view of creating a permanent income from investments. Funds may be obtained by an equal assessment of not more than three dollars annually, on each of the members; by individual voluntary contributions for specific objects; and by the sale and disposal of publications, or of works prepared for publication.

The funds may be appropriated for defraying the expenses of the annual meetings; for publishing the proceedings, memoirs, and transactions of the Association; for enabling the standing committees to fulfil their respective duties, conduct their correspondence, and procure the materials necessary for the completion of their stated annual reports; for the encouragement of scientific investigations, by prizes and awards of merit; and for defraying the expenses incidental to specific investigations under the instruction of the Association, where such investigations have been accompanied with an order on the Treasurer to supply the funds necessary for carrying them into effect.

VII. PROVISION FOR AMENDMENTS.

No amendment or alteration shall be made in any of these articles, except at the annual meeting next subsequent to that at which such amendment or alteration may have been proposed; and then only by the voice of three-fourths of all the members in attendance.

And, in acknowledgment of having adopted the foregoing propositions, and of our willingness to abide by them, and use our endeavors to carry into effect the objects of this Association, as above set forth—we have hereunto set our names.

NAMES OF MEMBERS.	RESIDENCE.	INSTITUTIONS REPRESENTED.

In connection with the foregoing "Plan of Organization," the following was adopted as one of the ordinances, or by-laws of the Association, viz:—

THE ORDER OF BUSINESS.

The order of business at the annual meetings of the American Medical Association shall at all times be subject to the vote of three-fourths of all the members in attendance; and, until permanently altered, except when for a time suspended, it shall be as follows, viz:—

1. The temporary organization of the meeting preparatory to the election of officers.
2. The report of the Committee of Arrangements on the credentials of members; after the latter have registered their names and addresses, and the titles of the institutions which they represent.
3. The calling of the roll.

4. The election of officers.

5. The reading of minutes.

6. The reception of members not present at the opening of the meeting, and the reading of notes from absentees.

7. The reception of members by invitation.

8. The reading and consideration of the stated annual reports from the standing committees.

9. The selection of the next place of annual meeting.

10. The new appointments to fill the standing committees.

11. The choice of permanent members by vote.

12. Resolutions introducing new business, and instructions to the permanent committees.

13. The reading and discussion of voluntary communications introduced through the Committee of Arrangements.

14. Unfinished and miscellaneous business.

15. Adjournment.

ORDINANCES.

The following *Resolutions*, adopted at different meetings of the Association, though not incorporated into the *Plan of Organization*, constitute a portion of the *Regulations* for the government of the Association.

RESOLUTIONS ADOPTED AT THE FOURTH ANNUAL MEETING, HELD IN CHARLESTON, IN 1851.

(See TRANSACTIONS, vol. iv.)

Resolved, That committees of three be appointed to investigate and report, severally, on the following subjects:—

1st. Causes of tubercular diathesis.

2d. Blending and conversion of the types of fever.

3d. The mutual relations of yellow fever and bilious remittent fever.

4th. Epidemic erysipelas.

5th. Acute and chronic diseases of the neck of the uterus.

6th. Dengue.

7th. The milk sickness so called.

8th. Endemic prevalence of tetanus.

9th. Diseases of parasitic origin.

10th. Physiological peculiarities and diseases of the Negro.

11th. The action of water on lead pipes, and the diseases which proceed from it.

12th. The alkaloids which may be substituted for quinia.

13th. Permanent cure of reducible hernia.

14th. Results of surgical operations for the relief of malignant diseases.

15th. Statistics of operations for removal of stone in the bladder.

16th. Cold water dressings.

17th. The sanitary principles applicable to the construction of dwellings.

18th. The toxicological and medicinal properties of our cryptogamic plants.

19th. Agency of the refrigeration produced through upward radiation of heat as an exciting cause of disease.

20th. Epidemic diseases of New England and New York.

21st. Epidemic diseases of Pennsylvania, New Jersey, Delaware, and Maryland.

22d. Epidemic diseases of Virginia and North Carolina.

23d. Epidemic diseases of South Carolina, Georgia, Florida, and Alabama.

24th. Epidemic diseases of Mississippi, Louisiana, Texas, and Arkansas.

25th. Epidemic diseases of Tennessee and Kentucky.

26th. Epidemic diseases of Missouri, Illinois, Iowa, and Wisconsin.

27th. Epidemic diseases of Indiana, Ohio, and Michigan.

Resolved, That a Committee on Nomination be appointed, whose duty it shall be to nominate one chairman for each of the above committees.

Resolved, That each of the chairmen thus nominated shall select, at his earliest convenience, two members of the Association, to complete the committee.

Resolved, That the delegates to the Association be requested to appoint committees, at one or more central points within their respective States, for the purpose of aiding the Committee of Publication in procuring subscribers, and in distributing the printed volumes of *Transactions* to said subscribers, as well as to the members of the Association residing within the neighborhood of the said committees, respectively. (Vol. vii. p. 22.)

Resolved, That this Association appoint a special committee for each State and Territory represented, of —— members, whose duty it shall be to report upon its medical topography, epidemic diseases, and the most successful treatment thereof, and that the same shall continue to hold their office for three years.

Resolved, That, as other States and Territories, not now represented, become so by delegates duly appointed to this National Association, similar committees shall be appointed for like purposes, and that they also shall hold their office for three years.

Resolved, That in the appointment of gentlemen of education and experience in the affairs of their own State, we have the best guarantee that the important objects we seek will be more satisfactorily accomplished, and the profession as well as the public interest thereby better served.

Resolved, That the committees heretofore appointed by this Association, at its session in Charleston, for a similar object, be and the same are hereby discharged. (Vol. viii.)

Resolved, That the resolutions adopted by the Association at its session in St. Louis, in 1854, requiring the Committee of Publication to be selected from the place where the meeting should be held, be repealed. (*Transactions*, vol. ix. p. 24.)

CODE OF ETHICS

OF THE

AMERICAN MEDICAL ASSOCIAT

ADOPTED MAY, 1847.

CODE OF MEDICAL ETHICS.

OF THE DUTIES OF PHYSICIANS TO THEIR PATIENTS, AND OF OBLIGATIONS OF PATIENTS TO THEIR PHYSICIANS.

ART. I.—*Duties of physicians to their patients.*

§ 1. A physician should not only be ever ready to obey tl of the sick, but his mind ought also to be imbued with th ness of his mission, and the responsibility he habitually in its discharge. Those obligations are the more deep and en because there is no tribunal other than his own consci adjudge penalties for carelessness or neglect. Physicians therefore, minister to the sick with due impressions of the ance of their office; reflecting that the ease, the health, a lives of those committed to their charge, depend on their s tention, and fidelity. They should study, also, in their depo so to unite *tenderness* with *firmness*, and *condescension* with a as to inspire the minds of their patients with gratitude, and confidence.

§ 2. Every case committed to the charge of a physician be treated with attention, steadiness, and humanity. Rea indulgence should be granted to the mental imbecility and of the sick. Secrecy and delicacy, when required by circumstances, should be strictly observed; and the famil confidential intercourse to which physicians are admitted professional visits, should be used with discretion, and most scrupulous regard to fidelity and honor. The oblig secrecy extends beyond the period of professional services of the privacies of personal and domestic life, no infirmity sition or flaw of character observed during professional att should ever be divulged by the physician, except whe

imperatively required to do so. The force and necessity of this obligation are indeed so great, that professional men have, under certain circumstances, been protected in their observance of secrecy by courts of justice.

§ 3. Frequent visits to the sick are in general requisite, since they enable the physician to arrive at a more perfect knowledge of the disease—to meet promptly every change which may occur, and also tend to preserve the confidence of the patient. But unnecessary visits are to be avoided, as they give useless anxiety to the patient, tend to diminish the authority of the physician, and render him liable to be suspected of interested motives.

§ 4. A physician should not be forward to make gloomy prognostications, because they savor of empiricism, by magnifying the importance of his services in the treatment or cure of the disease. But he should not fail, on proper occasions, to give to the friends of the patient timely notice of danger when it really occurs; and even to the patient himself, if absolutely necessary. This office, however, is so peculiarly alarming when executed by him, that it ought to be declined whenever it can be assigned to any other person of sufficient judgment and delicacy. For, the physician should be the minister of hope and comfort to the sick; that, by such cordials to the drooping spirit, he may smooth the bed of death, revive expiring life, and counteract the depressing influence of those maladies which often disturb the tranquillity of the most resigned in their last moments. The life of a sick person can be shortened not only by the acts, but also by the words or the manner of a physician. It is, therefore, a sacred duty to guard himself carefully in this respect, and to avoid all things which have a tendency to discourage the patient and to depress his spirits.

§ 5. A physician ought not to abandon a patient because the case is deemed incurable; for his attendance may continue to be highly useful to the patient, and comforting to the relatives around him, even in the last period of a fatal malady, by alleviating pain and other symptoms, and by soothing mental anguish. To decline attendance, under such circumstances, would be sacrificing to fanciful delicacy and mistaken liberality, that moral duty, which is independent of and far superior to, all pecuniary consideration.

§ 6. Consultations should be promoted in difficult or protracted cases, as they give rise to confidence, energy, and more enlarged views in practice.

§ 7. The opportunity which a physician not unfrequently enjoys

of promoting and strengthening the good resolutions of hi tients, suffering under the consequences of vicious conduct, never to be neglected. His counsels, or even remonstrances give satisfaction, not offence, if they be proffered with polit and evince a genuine love of virtue, accompanied by a si interest in the welfare of the person to whom they are addres

ART. II.—*Obligations of patients to their physicians.*

§ 1. The members of the medical profession, upon whom joined the performance of so many important and arduous towards the community, and who are required to make so sacrifices of comfort, ease, and health, for the welfare of thos avail themselves of their services, certainly have a right to and require, that their patients should entertain a just se the duties which they owe to their medical attendants.

§ 2. The first duty of a patient is, to select as his medical a one who has received a regular professional education. In nc or occupation, do mankind rely on the skill of an untaught and in medicine, confessedly the most difficult and intricate sciences, the world ought not to suppose that knowledge is int

§ 3. Patients should prefer a physician whose habits of li regular, and who is not devoted to company, pleasure, or t pursuit incompatible with his professional obligations. A should, also, confide the care of himself and family, as m possible, to one physician; for a medical man who has b acquainted with the peculiarities of constitution, habits, an dispositions, of those he attends, is more likely to be succes his treatment than one who does not possess that knowledge.

A patient who has thus selected his physician, should apply for advice in what may appear to him trivial cases, most fatal results often supervene on the slightest accidents. of still more importance that he should apply for assistance forming stage of violent diseases; it is to a neglect of this that medicine owes much of the uncertainty and imperfectio which it has been reproached.

§ 4. Patients should faithfully and unreservedly comm to their physician the supposed cause of their disease. Thi more important, as many diseases of a mental origin simulat depending on external causes, and yet are only to be cu ministering to the mind diseased. A patient should never be of thus making his physician his friend and adviser; he

treatment may be attended with equal success when employed singly, yet conjointly they are very likely to be productive of disastrous results.

§ 8. When a patient wishes to dismiss his physician, justice and common courtesy require that he should declare his reasons for so doing.

§ 9. Patients should always, when practicable, send for their physician in the morning, before his usual hour of going out; for, by being early aware of the visits he has to pay during the day, the physician is able to apportion his time in such a manner as to prevent an interference of engagements. Patients should also avoid calling on their medical adviser unnecessarily during the hours devoted to meals or sleep. They should always be in readiness to receive the visits of their physicians, as the detention of a few minutes is often of serious inconvenience to him.

§ 10. A patient should, after his recovery, entertain a just and enduring sense of the value of the services rendered him by his physician; for these are of such a character, that no mere pecuniary acknowledgment can repay or cancel them.

OF THE DUTIES OF PHYSICIANS TO EACH OTHER, AND TO THE PROFESSION AT LARGE.

ART. I.—*Duties for the support of professional character.*

§ 1. Every individual, on entering the profession, as he becomes thereby entitled to all its privileges and immunities, incurs an obligation to exert his best abilities to maintain its dignity and honor, to exalt its standing, and to extend the bounds of its usefulness. He should, therefore, observe strictly, such laws as are instituted for the government of its members;—should avoid all contumelious and sarcastic remarks relative to the faculty, as a body; and while, by unwearied diligence, he resorts to every honorable means of enriching the science, he should entertain a due respect for his seniors, who have, by their labors, brought it to the elevated condition in which he finds it.

§ 2. There is no profession, from the members of which greater purity of character, and a higher standard of moral excellence are required, than the medical; and to attain such eminence, is a duty every physician owes alike to his profession and to his patients. It is due to the latter, as without it he cannot command their respect and confidence, and to both, because no scientific attainments can

compensate for want of correct moral principles. It is also incumbent upon the faculty to be temperate in all things, for the practice of physic requires the unremitting exercise of a clear and vigorous understanding; and, on emergencies, for which no professional man should be unprepared, a steady hand, an acute eye, and an unclouded head may be essential to the well-being, and even to the life, of a fellow creature.

§ 3. It is derogatory to the dignity of the profession to resort to public advertisements, or private cards, or handbills, inviting the attention of individuals affected with particular diseases—publicly offering advice and medicine to the poor gratis, or promising radical cures; or to publish cases and operations in the daily prints, or suffer such publications to be made; to invite laymen to be present at operations, to boast of cures and remedies, to adduce certificates of skill and success, or to perform any other similar acts. These are the ordinary practices of empirics, and are highly reprehensible in a regular physician.

§ 4. Equally derogatory to professional character is it, for a physician to hold a patent for any surgical instrument or medicine; or to dispense a secret *nostrum*, whether it be the composition or exclusive property of himself or of others. For, if such nostrum be of real efficacy, any concealment regarding it is inconsistent with beneficence and professional liberality; and if mystery alone give it value and importance, such craft implies either disgraceful ignorance or fraudulent avarice. It is also reprehensible for physicians to give certificates attesting the efficacy of patent or secret medicines, or in any way to promote the use of them.

ART. II.—*Professional services of physicians to each other.*

§ 1. All practitioners of medicine, their wives, and their children while under the paternal care, are entitled to the gratuitous services of any one or more of the faculty residing near them, whose assistance may be desired. A physician afflicted with disease is usually an incompetent judge of his own case; and the natural anxiety and solicitude which he experiences at the sickness of a wife, a child, or any one who, by the ties of consanguinity, is rendered peculiarly dear to him, tend to obscure his judgment, and produce timidity and irresolution in his practice. Under such circumstances, medical men are peculiarly dependent upon each other, and kind offices and professional aid should always be cheerfully and gratuitously afforded. Visits ought not, however, to be

ously; as such unasked civility may give
arrassment, or interfere with that choice on which con
depends. But, if a distant member of the faculty, whose c
stances are affluent, request attendance, and an honorariu
offered, it should not be declined; for no pecuniary oblig
ought to be imposed, which the party receiving it would wish
to incur.

ART. III.—*Of the duties of physicians as respects vicarious offic*

§ 1. The affairs of life, the pursuit of health, and the var
accidents and contingencies to which a medical man is peculi
exposed, sometimes require him temporarily to withdraw from
duties to his patients, and to request some of his professi
brethren to officiate for him. Compliance with this request i
act of courtesy, which should always be performed with the ut
consideration for the interest and character of the family physi
and when exercised for a short period, all the pecuniary obligat
for such service should be awarded to him. But if a memb
the profession neglect his business in quest of pleasure and an
ment, he cannot be considered as entitled to the advantages of
frequent and long-continued exercise of this fraternal cour
without awarding to the physician who officiates the fees ar
from the discharge of his professional duties.

In obstetrical and important surgical cases, which give ri
unusual fatigue, anxiety, and responsibility, it is just that
fees accruing therefrom should be awarded to the physician
officiates.

ART. IV.—*Of the duties of physicians in regard to consultation*

§ 1. A regular medical education furnishes the only presum
evidence of professional abilities and acquirements, and oug
be the only acknowledged right of an individual to the ex
and honors of his profession. Nevertheless, as in consultation
good of the patient is the sole object in view, and this is ofte
pendent on personal confidence, no intelligent regular practiti
who has a license to practice from some medical board of k
and acknowledged respectability, recognized by this Associ
and who is in good moral and professional standing in the pl
which he resides, should be fastidiously excluded from fellov
or his aid refused in consultation, when it is requested by th
tient. But no one can be considered as a regular practitione

a new appointment. If it be the attending physician who is present, he will of course see the patient and prescribe; but if it be the consulting one, he should retire, except in case of emergency, or when he has been called from a considerable distance, in which latter case he may examine the patient, and give his opinion in *writing*, and *under seal*, to be delivered to his associate.

§ 6. In consultations, theoretical discussions should be avoided, as occasioning perplexity and loss of time. For there may be much diversity of opinion concerning speculative points, with perfect agreement in those modes of practice which are founded, not on hypothesis, but on experience and observation.

§ 7. All discussions in consultation should be held as secret and confidential. Neither by words nor manner should any of the parties to a consultation assert or insinuate, that any part of the treatment pursued did not receive his assent. The responsibility must be equally divided between the medical attendants—they must equally share the credit of success as well as the blame of failure.

§ 8. Should an irreconcilable diversity of opinion occur when several physicians are called upon to consult together, the opinion of the majority should be considered as decisive; but if the numbers be equal on each side, then the decision should rest with the attending physician. It may, moreover, sometimes happen, that two physicians cannot agree in their views of the nature of a case, and the treatment to be pursued. This is a circumstance much to be deplored, and should always be avoided, if possible, by mutual concessions, as far as they can be justified by a conscientious regard for the dictates of judgment. But in the event of its occurrence, a third physician should, if practicable, be called to act as umpire; and, if circumstances prevent the adoption of this course, it must be left to the patient to select the physician in whom he is most willing to confide. But, as every physician relies upon the rectitude of his judgment, he should, when left in the minority, politely and consistently retire from any further deliberation in the consultation, or participation in the management of the case.

§ 9. As circumstances sometimes occur to render a *special consultation* desirable, when the continued attendance of two physicians might be objectionable to the patient, the member of the faculty whose assistance is required in such cases, should sedulously guard against all future unsolicited attendance. As such consultations

require an extraordinary portion both of time and attention, at least a double honorarium may be reasonably expected.

§ 10. A physician who is called upon to consult, should observe the most honorable and scrupulous regard for the character and standing of the practitioner in attendance; the practice of the latter, if necessary, should be justified as far as it can be, consistently with a conscientious regard for truth, and no hint or insinuation should be thrown out which could impair the confidence reposed in him, or affect his reputation. The consulting physician should also carefully refrain from any of those extraordinary attentions or assiduities, which are too often practised by the dishonest for the base purpose of gaining applause, or ingratiating themselves into the favor of families and individuals.

ART. V.—*Duties of physicians in cases of interference.*

§ 1. Medicine is a liberal profession, and those admitted into its ranks should found their expectations of practice upon the extent of their qualifications, not on intrigue or artifice.

§ 2. A physician, in his intercourse with a patient under the care of another practitioner, should observe the strictest caution and reserve. No meddling inquiries should be made—no disingenuous hints given relative to the nature and treatment of his disorder; nor any course of conduct pursued that may directly or indirectly tend to diminish the trust reposed in the physician employed.

§ 3. The same circumspection and reserve should be observed when, from motives of business or friendship, a physician is prompted to visit an individual who is under the direction of another practitioner. Indeed, such visits should be avoided, except under peculiar circumstances; and when they are made, no particular inquiries should be instituted relative to the nature of the disease, or the remedies employed, but the topics of conversation should be as foreign to the case as circumstances will admit.

§ 4. A physician ought not to take charge of or prescribe for a patient who has recently been under the care of another member of the faculty in the same illness, except in cases of sudden emergency, or in consultation with the physician previously in attendance, or when the latter has relinquished the case, or been regularly notified that his services are no longer desired. Under such circumstances, no unjust and illiberal insinuations should be thrown out in relation to the conduct or practice previously pursued, which should

be justified as far as candor and regard for truth and probi permit; for it often happens that patients become dissatisfied they do not experience immediate relief, and, as many d are naturally protracted, the want of success, in the first st treatment, affords no evidence of a lack of professional kno and skill.

§ 5. When a physician is called to an urgent case, beca family attendant is not at hand, he ought, unless his assist consultation be desired, to resign the care of the patient latter immediately on his arrival.

§ 6. It often happens, in cases of sudden illness or of rece dents and injuries, owing to the alarm and anxiety of frien a number of physicians are simultaneously sent for. Unde circumstances, courtesy should assign the patient to the fi arrives, who should select from those present any additiona ance that he may deem necessary. In all such cases, howe practitioner who officiates should request the family phys there be one, to be called, and, unless his further attend requested, should resign the case to the latter on his arrival

§ 7. When a physician is called to the patient of anothe titioner, in consequence of the sickness or absence of the la ought, on the return or recovery of the regular attendant, a the consent of the patient, to surrender the case.

[The expression, "Patient of another Practitioner," is unc to mean a patient who may have been under the charge of practitioner at the time of the attack of sickness, or departu home of the latter, or who may have called for his att during his absence or sickness, or in any other manner giv be understood that he regarded the said physician as his medical attendant.]

§ 8. A physician, when visiting a sick person in the may be desired to see a neighboring patient who is un regular direction of another physician, in consequence sudden change or aggravation of symptoms. The condu pursued on such an occasion is to give advice adapted to circumstances; to interfere no further than is absolutely n with the general plan of treatment; to assume no future d unless it be expressly desired; and, in this last case, to an immediate consultation with the practitioner previo ployed.

§ 9. A wealthy physician should not give advice *grat*

OF THE DUTIES OF THE PROFESSION TO THE PUBLIC, AND OF THE OBLIGATIONS OF THE PUBLIC TO THE PROFESSION.

ART. I.—*Duties of the profession to the public.*

§ 1. As good citizens, it is the duty of physicians to be ever vigilant for the welfare of the community, and to bear their part in sustaining its institutions and burdens; they should also be ever ready to give counsel to the public in relation to matters especially appertaining to their profession, as on subjects of medical police, public hygiène, and legal medicine. It is their province to enlighten the public in regard to quarantine regulations—the location, arrangement, and dietaries of hospitals, asylums, schools, prisons, and similar institutions—in relation to the medical police of towns, as drainage, ventilation, &c.—and in regard to measures for the prevention of epidemic and contagious diseases; and when pestilence prevails, it is their duty to face the danger, and to continue their labors for the alleviation of the suffering, even at the jeopardy of their own lives.

§ 2. Medical men should also be always ready, when called on by the legally constituted authorities, to enlighten coroners' inquests, and courts of justice, on subjects strictly medical—such as involve questions relating to sanity, legitimacy, murder by poisons or other violent means, and in regard to the various other subjects embraced in the science of Medical Jurisprudence. But in these cases, and especially where they are required to make a *post-mortem* examination, it is just, in consequence of the time, labor, and skill required, and the responsibility and risk they incur, that the public should award them a proper honorarium.

§ 3. There is no profession, by the members of which eleemosynary services are more liberally dispensed than the medical, but justice requires that some limits should be placed to the performance of such good offices. Poverty, professional brotherhood, and certain of the public duties referred to in the first section of this article, should always be recognized as presenting valid claims for gratuitous services; but neither institutions endowed by the public or by rich individuals, societies for mutual benefit, for the insurance of lives or for analogous purposes, nor any profession or occupation, can be admitted to possess such privilege. Nor can it be justly expected of physicians to furnish certificates of inability to serve on juries, to perform militia duty, or to testify to the state

of health of persons wishing to insure their lives, obtain pensions, or the like, without a pecuniary acknowledgment. But to individuals in indigent circumstances, such professional services should always be cheerfully and freely accorded.

§ 4. It is the duty of physicians, who are frequent witnesses of the enormities committed by quackery, and the injury to health and even destruction of life caused by the use of quack medicines, to enlighten the public on these subjects, to expose the injuries sustained by the unwary from the devices and pretensions of artful empirics and impostors. Physicians ought to use all the influence which they may possess, as professors in Colleges of Pharmacy, and by exercising their option in regard to the shops to which their prescriptions shall be sent, to discourage druggists and apothecaries from vending quack or secret medicines, or from being in any way engaged in their manufacture and sale.

Art. II.—*Obligations of the public to physicians.*

The benefits accruing to the public, directly and indirectly, from the active and unwearied beneficence of the profession, are so numerous and important, that physicians are justly entitled to the utmost consideration and respect from the community. The public ought likewise to entertain a just appreciation of medical qualifications; to make a proper discrimination between true science and the assumptions of ignorance and empiricism—to afford every encouragement and facility for the acquisition of medical education—and no longer to allow the statute-books to exhibit the anomaly of exacting knowledge from physicians, under a liability to heavy penalties, and of making them obnoxious to punishment for resorting to the only means of obtaining it.

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AND

PERMANENT MEMBERS.

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OF THE

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OF THE

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Sanborn, Thomas	*New Port.*
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Smith, Joseph H.	*Dover.*
Spaulding, Edward	*Nashua.*
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Stone, W. P.	*Danbury.*

Thayer, W. H.	*Keene.*
†Twitchell, Amos	*do.*
Twitchell, George B.	*do.*
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Carr, Ezra T.	*Castleton.*
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Dana, A. G.	*Brandon.*
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Hatch, Horace	*do.*
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Niles, H. H.	*Post Mills.*
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Phelps, Edward E.	*Windsor.*
Pineo, P.	*Queechy.*
Pitkin, A. S.	*Burlington.*
Pittman, N. J.	*Brattleboro'.*
†Ranney, W. R.	*Townshend.*
Rockwell, W. H.	*Brattleboro'.*
Smith, Orrin	*Montpelier.*
Spalding, James	*do.*
Stiles, J. N.	*Strafford.*
Story, Dyer	*West Windsor.*
Thayer, S. W.	*Burlington.*
Washburn, Cyrus	*Vernon.*

Woodward, A. J.	*Castleton.*
Worcester, E. C.	*Thetford.*

MASSACHUSETTS.

Abbott, Samuel L.	*Boston.*
Adams, Horace W.	*do.*
Adams, Horatio	*Waltham.*
Adams, Nathan	*Springfield.*
†Adams, Z. Boylston	*Boston.*
Agassiz, Louis	*Cambridge.*
Ainsworth, F. S.	*Boston.*
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Allen, Nathan	*Lowell.*
Alley, J. B.	*Boston.*
Ayer, James	*do.*
Bacon, jr., John	*do.*
Bancroft, Amos B.	*Groton.*
Bartlett, George	*Boston.*
Bartlett, Josiah	*Concord.*
Bartlett, Lyman	*New Bedford.*
Barton, Edw.	*Orange.*
†Batcheller, Stephen	*Royalston.*
Bates, Joseph N.	*Barre.*
Bell, Luther V.	*Charlestown.*
Bemis, David	*Chickopee.*
Bemis, Jonathan W.	*Charlestown.*
Bethune, George A.	*Boston.*
Bigelow, George F.	*do.*
Bigelow, Henry J.	*do.*
Bigelow, Jacob	*do.*
Blake, E. W.	*do.*
Blake, Jeremiah	*Lowell.*
Blake, J. E.	*Boston.*
Borland, J. Nelson	*do.*
Boutelle, Thomas R.	*Fitchburgh.*
Bowditch, Henry J.	*Boston.*
Bowen, E.	*Barnstable.*
Bridgeman, William	*Springfield.*
Brown, Buckminster	*Boston.*
Brown, Jonathan	*Tewksbury.*

Eames, Ambrose N.	*Wrentham.*
Eastmah, E. T.	*Boston.*
Edwards, N. B.	*New Chemsford.*
Ellis, Calvin	*Boston.*
Farnum, jr., J.	*Salem.*
Fay, Allen C.	*Milford.*
Fay, Chas.	*Charlton.*
Fearing, Elisha P.	*Nantucket.*
Fisk, Samuel A.	*Northampton.*
Fisk, Calvin P.	*Fiskdale.*
Flint, Edward	*Leicester, Worcester Co.*
Flint, John	*Boston.*
Fogg, David L.	*Dedham.*
Folsom, Levi	*New Bedford.*
Forsyth, James B.	*Chelsea.*
Garland, G. W.	*Lawrence.*
Gay, George H.	*Boston.*
Gillman, B. F.	*Nantucket.*
Gordon, Charles	*Boston.*
Gordon, Timothy	*Plymouth.*
Gould, Augustus A.	*Boston.*
Graves, John W.	*Lowell.*
Green, John	*Worcester.*
Green, John O.	*Lowell.*
Guiteau, Coridon	*Lee.*
†Hale, Enoch	*Boston.*
Harpur, John	*Sandwich.*
Haskell, Benjamin	*Rockport.*
Hayden, Jno. C.	*Boston.*
Hayward, George	*do.*
Hayward, jr., George	*do.*
Heywood, B. F.	*Worcester, Worcester Co.*
Hitchcock, Alfred	*Fitchburgh, Worcester Co.*
Holmes, Christopher C.	*Milton, Norfolk Co.*
Holmes, Oliver W.	*Boston.*
Homans, John	*do.*
Homans, C. D.	*do.*
Hooker, Anson	*Cambridge.*
Hooker, Anson P.	*do.*
Hooper, Foster	*Fall River.*
Hooper, R. W.	*Boston.*

Odin, jr., John	*Boston.*
Otis, G. A.	*Springfield.*
Page, W. H.	*Boston.*
Palmer, E. D. G.	*do.*
†Parkman, George	*do.*
†Parkman, Samuel	*do.*
Parks, jr., Luther	*do.*
Patch, F. F.	*do.*
Peck, Wm. D.	*Sterling.*
†Pierson, A. L.	*Salem.*
Pierson, E. B.	*do.*
Perkins, Henry C.	*Newburyport.*
Perkins, John P.	*Great Barrington.*
Perry, M. S.	*Boston.*
Pierce, John	*Edgartown.*
†Pilsbury, John D.	*Lowell.*
Pond, Benjamin	*Westborough.*
Poole, Alexander	*Dennis.*
Pratt, Jefferson	*Hopkinton.*
Reynolds, Edward	*Boston.*
Reynolds, Joseph	*Gloucester.*
Richardson, Horace	*Boston.*
Robbins, James W.	*Uxbridge.*
Rook, O. S.	*Pittsfield.*
Root, Martin	*Byfield.*
Russell, Ira	*Nantick.*
Russel, Le Baron	*Boston.*
Salisbury, Stephen	*Brookline.*
Sargent, J.	*Worcester.*
Sargent, H.	*do.*
Sargent, Seneca	*Lawrence.*
Savory, Charles A.	*Lowell.*
Shattuck, jr., George C.	*Boston.*
Shattuck W.	*do.*
Shurtleff, Augustine	*Brookline.*
Shurtleff, Nathaniel B.	*Boston.*
†Smith, James M.	*Springfield.*
Smith, J. V. C.	*Boston.*
Snow, A. B.	*do.*
Spaulding, Miles	*Dunstable.*
Spooner, John P.	*Dorchester.*

RHODE ISLAND.

Allen, Hiram	*Woonsocket.*
Arnold, S. Augustus	*Providence.*
Ballou, A. W.	*do.*
Baker, Geo. P.	*do.*
Brown, W. O.	*do.*
Brownell, Richmond	*do.*
Capron, George	*do.*
Clapp, Sylvanus	*Pawtucket.*
Cleveland, H.	*New Providence.*
†Clifford, Lewis W.	*Providence.*
Collins, George L.	*do.*
Dunn, Theophilus C.	*Newport.*
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Ely, James W. C.	*Providence.*
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Fowler, Ezekiel	*Woonsocket Falls.*
King, David	*Newport.*
Le Prohon, E. P.	*Providence.*
Mauran, Joseph	*do.*
Miller, Lewis L.	*do.*
Parsons, Charles W.	*do.*
Parsons, Usher	*do.*
Peckham, F. H.	*do.*
Pierce, G. A.	*do.*
Pratt, H. P.	*do.*
Rivers, H. W.	*do.*
Snow, Ed. M.	*do.*
Warren, J. E.	*Cumberland.*

CONNECTICUT.

Barrows, Ashbel W.	*Hartford.*
†Beach, Samuel	*Bridgeport.*
Beardsley, Lucian N.	*Milford.*
Beardsley, Sheldon	*New Haven.*
Beckwith, Josiah, G.	*Litchfield.*
Bennett, Hanford N.	*Bridgeport.*
Beresford, S. B.	*Hartford.*
Bishop, E. H.	*New Haven.*

Blackman, G.	*Westport.*
Bostwick, D. E.	*Litchfield.*
†Bowen, Samuel	*Thompson.*
Bradford, Milton	*West Woodstock.*
Brigham, Norman	*North Mansfield.*
Brinley, E. H.	*Hartford.*
Bronson, Henry	*New Haven.*
Brown, Jas.	*Waterbury.*
Brownell, Clarence M.	*East Hartford.*
Budington, George E.	*New Haven.*
Burke, George W.	*Middletown.*
Burr, David S.	*Westport.*
Campbell, Harvey	*Voluntown.*
Canfield, Joel	*Guilford.*
†Carrington, Edwin W.	*Farmington.*
Casey, William B.	*Middletown.*
Castle, Andrew	*Woodbridge.*
Catlin, Benjamin H.	*West Meriden.*
Catlin, Samuel	*Watertown.*
Comings, B. N.	*New Britain.*
Comstock, Jos.	*Lebanon.*
Crary, David	*Hartford.*
Deming, Ralph	*Sharon.*
Dickinson, Francis L.	*Willington.*
Downes, John K.	*New Haven.*
Downing, Eleazer B.	*Preston.*
Ford, John D.	*Norwich.*
Fowler, Remus M.	*Washington.*
Francis, D. P.	*New London.*
Gillett, H. C.	*South Windsor.*
Haile, Ashbel B.	*Norwich.*
Hall, Eli	*East Hartford.*
Hammond, Justin	*Daysville.*
†Harrison, David	*Middletown.*
†Hatch, Johnson C.	*Kent.*
Hawley, Roswell	*West Meriden.*
Hooker, Charles	*New Haven.*
Hooker, Worthington	*do.*
Hubbard, Denison H.	*Clinton.*
Hubbard, Robert	*Bridgeport.*
Hubbard, Stephen G.	*New Haven.*

Hutchins, Samuel	*West Killingly.*
Hutchinson, Ira	*Cromwell.*
Huxley, A. M.	*Goshen.*
Ives, Eli	*New Haven.*
Ives, Nathan B.	*do.*
Jarvis, George O.	*Portland.*
Jewett, Pliny A.	*New Haven.*
Knight, Jonathan	*do.*
Lewis, J. B.	*Vernon.*
Lindsley, Charles A.	*New Haven.*
†Lyman Norman	*Warren.*
Matthews, H. W. E.	*New Haven.*
Middlebrook, Elijah	*Trumbull.*
Moody, G. A.	*Plainville.*
Nicoll, John	*New Haven.*
North, B. B.	*Cornwall.*
Noyes, Samuel S.	*New Canaan.*
Nye, Elisha B.	*Middletown.*
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†Pike, Nathan S.	*Sterling Hill.*
Platt, Gideon L.	*Waterbury.*
Rockwell, P. G.	*do.*
Rogers, Benjamin	*Hartford.*
Russell, Gurdon W.	*do.*
Salisbury, Samuel T.	*Plymouth.*
Sanford, Leonard J.	*New Haven.*
Seymour, Geo.	*Litchfield.*
Silliman, jr., Benjamin	*New Haven.*
Skinner, Alden	*Rockville.*
St. John, Gamaliel H.	*Merwinsville.*
†Sumner, George	*Hartford.*
Talcott, Alvan	*Guilford.*
Totten, Thomas H.	*New Haven.*
†Warner, Richard	*Cromwell.*
†Webb, Reynold	*Madison.*
†Welch, Archibald	*Hartford.*
Welch, Benjamin	*Lakeville.*
Welch, James	*Winstead.*
Welch, William W.	*Norfolk.*
White, Roderick A.	*Simsbury.*

Wilcox, J. D.	*Hartford.*
Williams, Lewis	*Pomfret.*
†Wilson, Myron W.	*Hartford.*
†Witter, William	*Willimantic.*
Wood, William	*East Windsor Hill.*
Woodruff, William	*Plymouth.*
Woodword, Ashbel	*Franklin.*
Wright, Albert A.	*Canaan.*

NEW YORK.

Acosta, E.	*New York.*
Adams, John G.	*do.*
Allen, R. L.	*Saratoga Springs.*
Allen, Lucius A.	*Owego, Tioga Co.*
Anderson, James	*New York.*
Anderson, W. C.	*Stapleton.*
Armsby, James H.	*Albany.*
Armstrong, E. W.	*Rochester.*
Atwater, D. F.	*Brooklyn.*
Austin, James M.	*Waterford.*
Ayres, Daniel	*Brooklyn.*
Ayres, Daniel	*Amsterdam.*
Babcock, Charles	*New Hartford, Oneida Co.*
Babcock, M. N.	*Saratoga Springs.*
Bacon, C. G.	*Fulton.*
Baker, jr., A.	*Norwich.*
Barker, B. Fordyce	*New York.*
Ball, John	*Brooklyn.*
Barrett, S.	*Le Roy.*
Bartlett, Homer L.	*Flatbush.*
Batchelder, J. P.	*New York.*
Bauer, Louis	*Brooklyn.*
Bay, William	*Albany.*
Baxter, Hiram	*Stillwater, Saratoga Co.*
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Beardsley, Levi	*Oneida.*
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Blakeman, William N.	*New York.*
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Briggs, W. H.	*Rochester.*
Brinsmade, Thomas C.	*Troy.*
Brooks, P. B.	*Binghampton, Broome Co.*
Brown, H. W.	*New York.*
Buck, Gurdon	*do.*
Budd, A. E.	*Medford, Burlington Co.*
Budd, C. A.	*New York.*
Budlong, Caleb	*Frankford, Herkimer Co.*
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Bulkley, Henry D.	*do.*
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Burwell, Bryant	*Buffalo.*
Burwell, George N.	*do.*
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Cammann, G. P.	*do.*
Carr, Edson	*Canandaigua, Ontario Co.*
Cary, Walter	*Buffalo.*
Carter, Galen	*New York.*
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Clements, James W. G.	*do.*
Clymer, Meredith	*do.*
Cobb, J. V.	*Rome.*
Cock, Thomas	*New York.*
Cock, Thomas F.	*do.*
Cockcroft, James	*do.*
Coe, A. B.	*Oswego.*

Colt, John	*Batavia.*
Conant, D. S.	*New York.*
Congar, Horace M.	*Buffalo.*
Cook, Simeon A.	*Buskirk's Bridge.*
Corliss, Hiram	*Greenwich, Washington Co.*
Corson, J. W.	*New York.*
Corson, J.	*do.*
Cotes, John	*Batavia.*
Cotes, L. B.	*do.*
Coventry, C. B.	*Utica.*
Crandell, R. O.	*Owego.*
Crane, James	*Brooklyn.*
Dalton, J. C.	*New York.*
Daniels, E.	*Union, Broome Co.*
Davis, E. H.	*New York.*
Dean, H. W.	*Rochester.*
Delafield, Edward	*New York.*
Deming, J. P. H.	*Palmyra.*
Dering, Nicoll H.	*Utica.*
Detmold, W.	*New York.*
Donoughue, E. O.	*Bergen, Genesee Co.*
Doolittle, A. F.	*Herkimer.*
Douglas, J. Hancock	*New York.*
Downs, Henry S.	*do.*
Draper, John W.	*do.*
Dubois, Abram	*do.*
†Dwight, W. C.	*Moscow, Livingston Co.*
Earle, Pliny	*New York.*
Eastman, M. H.	*Owego.*
Elliott, jr., Geo. T.	*New York.*
Ely, W. W.	*Rochester.*
Emmet, Thomas Addis	*New York.*
Enos, D. C.	*Brooklyn.*
Ferguson, Jno. T.	*New York.*
Fisher, G. I.	*Sing Sing.*
Finnell, T. C.	*New York.*
Flint, Austin	*do.*
Folsom, Levi	*do.*
Ford, Corydon L.	*Lockport.*
Foster, Joel	*New York.*
Foster, S. Conant	*do.*

Francis, John W.	*New York.*
French, S. H.	*Lisle, Broome Co.*
Gardner, Augustus K.	*New York.*
Garrish, J. P.	*do.*
Gilman, Chandler R.	*do.*
Glück, Isidore	*do.*
Gomez, Horatio	*do.*
Goodsell, Thomas	*Utica.*
Gray, Henry C.	*North White Creek.*
Green, David	*New York.*
Green, Horace	*do.*
Green, J. W.	*do.*
Greene, Caleb	*Homer, Cortland Co.*
†Greene, Isaac	*New York.*
Goodyear, Miles	*Cortland.*
Griscom, John H.	*New York.*
Guthrie, C. B.	*do.*
Hadley, George	*Buffalo.*
Halstad, T. M.	*New York.*
Hamilton, Frank H.	*Buffalo.*
Harrington, S. H.	*Chenango Forks.*
Harris, Elisha	*New York.*
Harvey, Charles W.	*Buffalo.*
Hard, P. H.	*Oswego.*
Hart, John	*New York.*
Hart, Samuel	*Brooklyn.*
Hawley, Joel E.	*Ithaca.*
Henschell, C.	*New York.*
Heywood, C. F.	*do.*
Hovey, B. L.	*Dansville.*
Holcomb, W. F.	*New York.*
Hubbard, Samuel T.	*do.*
Hubbard, Silas	*Buffalo.*
Hun, Thomas	*Albany.*
Hunt, Sanford B.	*Buffalo.*
Husted, N. C.	*New York.*
Hutchison, J. C.	*Brooklyn.*
Hyde, Frederick	*Cortlandville.*
Hyde, Lucius	*Brooklyn.*
Ingraham, T. M.	*Flatbush.*
Jackson, Thomas	*Binghampton.*

Newman, Jas. M.	*Buffalo.*
Ogden, Benjamin	*New York.*
Orton, J. G.	*Binghampton.*
Parker, Willard	*New York.*
Parker, Edward H.	*do.*
Parkhurst, W. H. H.	*Frankfort.*
Parmley, Eleazer	*New York.*
†Pattison, Granville S.	*do.*
Peters, George A.	*do.*
Phelps, James L.	*do.*
Phillips, S. B.	*do.*
Pierce, J. B.	*Lyons.*
Pomeroy, Charles G.	*Newark, Wayne Co.*
Pond, James O.	*New York.*
Pope, H. H.	*Rome.*
Post, Alfred C.	*New York.*
Potter, U.	*Minden, Montgomery Co.*
Punnett, John	*New York.*
Purdy, J.	*Elmira, Chemung Co.*
Purdy, Samuel A.	*New York.*
Purple, S. S.	*do.*
Raymond, Charles H.	*do.*
Reese, D. Meredith	*do.*
Reid, Jno.	*Rochester.*
Reynolds, Tabor B.	*Wilton, Saratoga Co.*
Reynolds, J. H.	*do.*
Rockwell, Wm.	*New York.*
Rodgers, D. L.	*New Rochelle.*
†Rodgers, J. Kearny	*New York.*
Russ, J. D.	*do.*
Saunders, A. L.	*Brookfield, Madison Co.*
Sayre, Lewis A.	*New York.*
Schilling, E.	*do.*
Shanks, John	*do.*
Sheltin, John	*Jamaica.*
Shipman, Azariah B.	*Syracuse.*
Sims, J. M.	*New York.*
Skilton, Avery J.	*Troy.*
Smith, Albert	*New Rochelle.*
Smith, Charles D.	*New York.*
Smith, G. M.	*do.*

Smith, Joseph M.	*New York.*
Smith, Stephen	*do.*
Snow, Simeon	*Root, Montgomery Co.*
Snyder, Morgan	*Fort Plain.*
Sprague, J. S.	*Exeter, Otsego Co.*
†Stearns, John	*New York.*
Stephenson, M. P.	*do.*
Stephenson, Mark	*do.*
Stevens, Alexander H.	*do.*
Stewart, F. Campbell	*do.*
Stewart, James	*do.*
Stewart, Philanda	*Peekskill.*
St. John, Samuel	*New York.*
Stout, Arthur B.	*do.*
Stone, J. O.	*do.*
Stoube, Fred.	*do.*
Strew, W. W.	*Oyster Bay.*
Sturdivant, J. M.	*Rome.*
Swaine, Chas. H.	*Cortlandville.*
†Swett, John A.	*New York.*
†Taft, Marcus L.	*do.*
Taylor, Isaac E.	*do.*
Taylor, Wm.	*Manlius.*
Tefft, Lake J.	*Onondaga.*
Tellkampf, Theo. A.	*New York.*
Thomas, Daniel	*Utica.*
Thompson, jr., A. G.	*New York.*
Thompson, A. H.	*Walden.*
Thompson, Alexander	*Aurora, Cayuga Co.*
Thorn, James	*Troy.*
Townsend, Howard	*Albany.*
Trask, J. D.	*White Plains.*
Trenor, Jno.	*New York.*
Turner, Thomas	*Flatbush.*
Van Buren, W. H.	*New York.*
Van Buren, Peter	*do.*
Vanderpool, S. O.	*Albany.*
Van Kleek, John R.	*New York.*
Van Pelt, M. D.	*do.*
Van Rensselaer, Alexander	*do.*
Wade, T. A.	*Brooklyn.*

Warner, E. B.	*New York.*
Warren, James	*do.*
Watson, John	*do.*
Watts, Robert	*do.*
Weber, G.	*do.*
Weeks, Cyrus	*do.*
West, S.	*Binghampton, Broome Co.*
Wheeler, Lewis C.	*Troy.*
White, Devillo	*Sherburne, Chenango Co.*
White, James P.	*Buffalo.*
While, Oliver	*New York.*
White, S. P.	*do.*
Willard, Augustus	*Green, Chenango Co.*
Wilcox, Charles H.	*Buffalo.*
Winton, Nelson	*Havana.*
†Wing, Joel A.	*Albany.*
Wood, Isaac	*New York.*
Wood, James R.	*do.*
Woodhull, H. W. B.	*do.*
Woodward, G.	*do.*
Worster, Joseph	*do.*
Wotkyns, Alfred	*Troy.*

NEW JERSEY.

Bateman, Ephraim	*Cedarville.*
Bateman, B. Rush	*do.*
Blane, J.	*Perryville.*
Brakeley, P. F.	*Belvidere, Warren Co.*
Butcher, Charles	*Maurice Town, Cumberland*
Canfield, J. W.	*Morristown.*
Chetwood, G. R.	*Elizabethtown.*
Clark, C. F.	*Woodbury.*
Clark, H. C.	*do.*
Clarke, J. Henry	*Newark.*
†Cole, N. W.	*Burlington.*
Coleman, J. B.	*Trenton.*
Coleman, J. P.	*Pemberton.*
Condict, Lewis	*Morristown.*
Cook, Chas.	*Jersey City.*
Cooper, Richard M.	*Camden.*

Corson, T. J.	*Trenton.*
Craig, J. W.	*Plainfield.*
Cullen, Thomas F.	*Camden.*
Dayton, A. B.	*Middletown Point.*
Dougherty, Alexander N.	*Newark.*
Elmer, William	*Bridgeton.*
Fithian, Enoch	*Greenwich.*
Fithian, Joseph	*Woodbury.*
Garrison, Charles	*Swedesboro'.*
Garrison, J. F.	*do.*
Gibbon, Quinton	*Salem.*
Godell, Geo.	*Plattsburg.*
Grant, Gabriel	*Newark.*
Haines, Job	*Burlington.*
Hampton, Isaac H.	*Bridgeton.*
Hendry, Charles D.	*Camden Co.*
Hunt, T. Edgar	*Clarksville.*
Janeway, J. H.	*Princeton.*
Jobs, Eugene	*Springfield.*
Longstreet, H. H.	*Bordentown.*
Marsh, Elias J.	*Paterson.*
Martin, S. K.	*Martinville.*
Moore, C. V.	*Stillwater.*
Morford, A. D.	*Newton.*
Mulford, Isaac L.	*Camden.*
Munn, J. B.	*Chatham, Morris Co.*
Nichols, Whitfield	*Newark.*
Oakley, L. W.	*Elizabeth City.*
Page, R. H.	*Columbus.*
Phillips, John H.	*Pennington.*
Pennington, Samuel H.	*Newark.*
Pierson, W.	*Orange.*
Porter, E. M.	*Bridgeton.*
Rogers, Alexander W.	*Paterson.*
Read, Zachariah	*Mount Holly.*
Saunders, Thos. J.	*Woodbury.*
Schenck, F. S.	*Camden.*
Schenck, J. V.	*do.*
Schively, Geo. S.	*Mount Holly.*
Sickler, J. R.	*Carpenter's Land.*
Smith, Lyndon A.	*Newark.*

Steuart, J. R.	*Newton.*
Stratton, B. H.	*Mount Holly.*
Taylor, Othniel H.	*Camden.*
Thompson, Jno.	*Hoboken.*
Woodruff, A. D.	*Haddonfield.*

PENNSYLVANIA.

Allen, J. M.	*Philadelphia.*
Andrews, James P.	*Lancaster.*
Ashmead, William	*Philadelphia.*
Atlee, Washington L.	*Philadelphia.*
Atlee, John L.	*Lancaster.*
Bache, Franklin	*Philadelphia.*
Bache, T. H.	*do.*
Baker, Charles L.	*Lancaster.*
Bare, A. S.	*do.*
Barrington, Samuel	*Philadelphia.*
†Baskin, George W.	*Mercer.*
Bell, John	*Philadelphia.*
Bertolet, P. G.	*Oley.*
Betton, Thomas F.	*Germantown.*
†Bibighaus, C. H.	*Philadelphia.*
Biddle, John B.	*do.*
Bird, J. F.	*do.*
Blair, A. R.	*York.*
Bond, Henry	*Philadelphia.*
Breitenbach, J.	*Myerstown.*
Bridges, Robert	*Philadelphia.*
Brinton, John B.	*Westchester.*
Brown, H. J.	*Philadelphia.*
Bruce, S. D.	*Pittsburg.*
Bryan, Joseph R.	*Philadelphia.*
Bryan, James	*do.*
Burden, Jesse R.	*do.*
†Burrowes, Francis S.	*Lancaster.*
Butler, S. W.	*Philadelphia.*
Carpenter, Henry	*Lancaster.*
Carpenter, James S.	*Pottsville.*
Carson, Joseph	*Philadelphia.*
Carson, William	*do.*

Cassidy, P.	*Lancaster.*
†Chapman, Nathaniel	*Philadelphia.*
Coates, B. Hornor	*do.*
Condie, D. Francis	*do.*
Confer, J. M.	*Fasteria.*
Conrey, Jno.	*Manayunk.*
Corse, J. M.	*Philadelphia.*
Corson, Hiram,	*Plymouth Meeting, Mont. Co.*
Corson, W.	*Norristown.*
Cunningham, Oliver	*Beaver.*
Curtis, L.	*Philadelphia.*
Da Costa, J.	*do.*
Darlington, William	*Westchester.*
Dillard, T.	*Philadelphia.*
Dilworth, Samuel	*Pittsburg.*
Dorsey, J. H.	*Huntington.*
Drayton, H. E.	*Philadelphia.*
†Duffield, Samuel	*Lancaster.*
Duncan, Robt.	*do.*
Dunglison, Robley	*Philadelphia.*
Dyer, Jno.	*Danborough.*
Edge, J. P.	*Downingtown.*
Ehler, J. Augustus	*Lancaster.*
Ellmaker, Thomas	*do.*
Ely, Edward	*New Hope, Bucks Co.*
Emanuel, M.	*Marcus Hook.*
Emerson, Gouverneur	*Philadelphia.*
Emlen, J. V.	*do.*
Eshleman, J. K.	*Lancaster Co.,*
Feay, John	*Williamsburg.*
Finley, W. R.	*Frankstown.*
Fish, A. H.	*Philadelphia.*
Foulke, J. L.	*Gwynedd, Montgomery Co.*
Fox, George	*Philadelphia.*
Fronefield, Charles	*Montgomery Co.*
Gallaher, W.	*Philadelphia.*
Gaston, A. K.	*Chester Co.*
Gazzam, Joseph P.	*Pittsburg.*
Gemmill, J. N.	*Alexandria.*
Gerhard, William W.	*Philadelphia.*
Gibson, William	*do.*

Gilbert, David	*Philadelphia.*
Given, R. A.	*do.*
Gobrecht, W. H.	*do.*
Goddard, P. B.	*do.*
†Grant, William R.	*do.*
Green, Jas. M.	*do.*
Green, Traill	*Easton.*
Gries, Wm.	*Reading.*
Gross, S. D.	*Philadelphia.*
Gryder, M. R.	*Chestnut Level, Lancaster*
Guilford, W. M.	*Lebanon.*
Haines, William S.	*Philadelphia.*
Halberstadt, Geo.	*Pottsville.*
Hallowell, Edward	*Philadelphia.*
Halsey, W. S.	*do.*
Handy, J. H.	*do.*
Harry, Samuel H.	*Doe Run, Chester Co.*
Hart, Alexander C.	*Philadelphia.*
Hartshorne, Edward	*do.*
Hartshorne, Henry	*do.*
Hatfield, N. L.	*do.*
Hays, Isaac	*do.*
Heger, Anthony	*Pottsville.*
Herbst, Wm.	*Reading.*
Hewson, Addinell	*Philadelphia.*
Hiester, Frank M.	*Reading.*
Hiester, J. P.	*do.*
Hinkle, Franklin	*Marietta.*
Hodge, Hugh L.	*Philadelphia.*
Hollingsworth, S. L.	*do.*
Horner, G. R. B.	*do.*
†Horner, William E.	*do.*
Horton, Geo. F.	*Ferrytown.*
†Humes, Samuel	*Lancaster.*
Hunter, C. H.	*Reading.*
Huston, Robert M.	*Philadelphia.*
Innes, Charles	*Easton.*
Irwin, John S.	*Pittsburg.*
Jackson, R. M. J.	*Cresson.*
Jackson, Samuel (Prof.)	*Philadelphia.*
Jackson, Samuel	*do.*

James, R. E.	*Stonechurch.*
James, Charles	*Easton.*
James, O. P.	*Doylestown.*
Janney, Benjamin S.	*Philadelphia.*
Jewell, Wilson	*do.*
Keating, Wm. V.	*do.*
Keith, William	*do.*
Keneagy, Samuel	*Strasburg, Lancaster Co.*
Kennedy, A. L.	*Philadelphia.*
Kerr, James W.	*York, York Co.*
†Kerfoot, George B.	*Lancaster.*
King, Charles R.	*Philadelphia.*
†Klapp, William H.	*do.*
Knight, W. L.	*do.*
Koehler, J. G.	*Schuylkill Haven.*
Lajus, D. Paul	*Philadelphia.*
†Lang, Edmund	*do.*
Lamb, Jno. F.	*Frankford.*
La Roche, C. Percy	*Philadelphia.*
La Roche, R.	*do.*
†Leib, Henry F.	*do.*
Levis, M. M.	*do.*
Leidy, Jos.	*do.*
Lewis, Samuel	*do.*
Littell, S.	*do.*
Lowman, Jno.	*Johnstown, Cambria Co.*
Luden, J. B.	*Huntingdon.*
Ludlow, J. L.	*Philadelphia.*
Madison, R. L.	*do.*
Mahon, O. S.	*Columbia.*
Martin, Chas. H.	*Allentown.*
Martin, J. A.	*Whitemarsh.*
†Mathews, Charles H.	*Doylestown.*
Mayburry, William	*Philadelphia.*
McClellan, J. H. B.	*do.*
McClurg, J. R.	*Chandlerville.*
McCorkle, W. S.	*Columbia.*
McCoy, John M.	*Bellefonte.*
McCulloch, John	*Huntingdon.*
McIlvain, William	*York.*
Meigs, Charles D.	*Philadelphia.*

Meigs, J. A.	*Philadelphia.*
†Mitchell, John K.	*do.*
Mitchell, Thomas D.	*do.*
Moore, John Wilson	*do.*
Morris, Casper	*do.*
Morris, J. Cheston	*do.*
†Morton, Samuel George	*do.*
Morton, C. J.	*Springfield.*
Mosser, D. O.	*Breinyville.*
Mowry, Robert B.	*Alleghany City.*
Muhlenburg, F. H.	*Lancaster.*
Muhlenburg, Henry E.	*do.*
Murphey, Andrews	*Parkesburg, Chester Co.*
Mütter, Thomas D.	*Philadelphia.*
Naudain, Arnold	*do.*
Nebinger, A.	*do.*
Neill, John	*do.*
Newberry, Milton	*Whitemarsh.*
Norris, George W.	*Philadelphia.*
†Ogier, S. A.	*Frazer, Chester Co.*
Orlady, H.	*Petersburg, Huntingdon Co.*
Osler, O.	*Philadelphia.*
Page, William Byrd	*do.*
Pancoast, Joseph	*do.*
Parker, Samuel	*Hempfield, Lancaster Co.*
†Parrish, Isaac	*Philadelphia.*
Parrish, Joseph	*Germantown.*
Parry, Ely	*Lancaster.*
†Patterson, Henry S.	*Philadelphia.*
†Patterson, George W.	*do.*
Paul, J. Rodman	*do.*
Pennypacker, I. A.	*do.*
Pepper, William	*do.*
Piper, W. A.	*do.*
Pollock, A. M.	*Pittsburg.*
Powell, F. W.	*Philadelphia.*
†Randolph, Jacob	*do.*
Raub, J. K.	*Quarryville.*
Ream, John	*Lancaster.*
Reese, J. J.	*Philadelphia.*
Remington, Isaac	*do.*

Richards, C. O.	*Lancaster.*
Richardson, T.	*Brooklyn.*
Rieser, Franklin	*Reading.*
Rieser, F.	*Frazer, Chester Co.*
Rivinus, Edward F.	*Westchester.*
Rodman, Lewis	*Philadelphia.*
†Rogers, James B.	*do.*
Rogers, R. E.	*do.*
Rohrer, B.	*Columbia.*
Ross, J. D.	*Williamsburg.*
Rothrock, Abm.	*Mc Veytown.*
Ruschenberger, W. S. W.	*Philadelphia.*
Sargent, jr., Winthrop	*West Philadelphia.*
Sheller, Adam	*Mt. Joy, Lancaster Co.*
Shelmerdine, R. Q.	*Philadelphia.*
Schneck, B. F.	*Lebanon, Lancaster Co.*
Shoemaker, Charles	*Jenkintown.*
Slocum, A. M.	*Philadelphia.*
Smaltz, J. H.	*do.*
Smith, jr., Francis G.	*do.*
Smith, H. H.	*do.*
Smith, H. Y.	*do.*
Smith, Moses B.	*do.*
Smith, R. K.	*do.*
†Spencer, Thomas D.	*do.*
Stanton, David	*New Brighton, Beaver Co.*
Stewart, J. D.	*Philadelphia.*
Stillé, Alfred	*do.*
†Stillé, Moreton	*do.*
Stocker, A. E.	*do.*
Stubbs, J. B.	*Rock P. O., Lancaster Co.*
Swift, Edward	*Easton.*
Thomas, George W.	*Norristown.*
Thomas, Isaac	*Westchester.*
Thomas, R. P.	*Philadelphia.*
Thomason, W. D.	*Harrisburg.*
Thompson, William S.	*Lancaster.*
Todd, J. E.	*Philadelphia.*
Townsend, R. H.	*do.*
Townsend, W. W.	*Chatham.*
Treichler, S. K.	*Jonestown.*

Turnbull, Laurence	*Philadelphia.*
Uhler, John	*do.*
Vanbuskirk, Wm. A.	*Pottstown, Montgomery Co.*
Wadsworth, Henry	*Philadelphia.*
Walker, Isaac R.	*Spread Eagle, Chester Co.*
Wallace, Edward	*Reading.*
Wallace, Ellerslie	*Philadelphia.*
Watson, William H.	*Bedford.*
West, Francis	*Philadelphia.*
Weidler, Isaac C.	*Leacock P. O., Lancaster Co.*
Wilcocks, Alexander	*Philadelphia.*
Wiley, Penrose	*Leesport.*
Wilson, William J.	*Potter's Mill, Centre Co.*
Wilson, Elwood	*Philadelphia.*
Wiltbank, John	*do.*
Wimley, G. W.	*Limerick Township, Mont. Co.*
Wister, Caspar	*Philadelphia.*
Wood, George B.	*do.*
Wood, Thomas	*Muncy, Lycoming Co.*
Worthington, Wilmer	*Westchester.*
Yardley, Thomas H.	*Philadelphia.*
Zeigler, J. L.	*Mount Joy P. O., Lancaster Co.*
Zeigler, George J.	*Philadelphia.*
Zulick, S. M.	*Orwigsburg.*

DELAWARE.

Askew, Henry F.	*Wilmington.*
Baker, George R.	*do.*
Bullock, W. R.	*do.*
Bush, Lewis P.	*do.*
Clark, R. H.	*Milford.*
Couper, James	*New Castle.*
Cummins, William	*Smyrna.*
Dailey, E. D.	*do.*
Grimshaw, A. H.	*Wilmington.*
Hamilton, William N.	*Cantwell's Bridge.*
Johnson, R. P.	*Wilmington.*
Jones, W.	*Vernon.*
Jump, Isaac	*Dover.*
Merritt, John	*Middletown.*

Mitchell, J. R.	*Milford.*
Morris, William W.	*Dover.*
Perkins, John D.	*Smyrna.*
Porter, Robert R.	*Wilmington.*
Saulsbury, G.	*Dover.*
†Smith, Thomas Mackie	*Brandywine.*
Thomson, James W.	*Wilmington.*
Wales, J. P.	*Brandywine.*
Wilson, James F.	*Wilmington.*

MARYLAND.

Alexander, Ashton	*Baltimore.*
Armitage, James	*do.*
Atkinson, Thomas C.	*do.*
†Baer, M. S.	*do.*
Baker, Alfred	*do.*
Baldwin, E. C.	*do.*
Baltzell, W. H.	*do.*
Baxley, Willis H.	*do.*
Belt, W. F.	*Prince George.*
Bolton, James	*Baltimore.*
Bond, Thomas E.	*Falston.*
Bordley, James	*Baltimore.*
Boyd, Charles	*Frederick City.*
Briscoe, John H.	*Baltimore.*
Buckler, Thomas H.	*do.*
Chamberlaine, J. E. M.	*Easton.*
Chew, Samuel	*Baltimore.*
Clarke, S. R.	*do.*
Cohen, Joshua J.	*do.*
Coleman Jas. S.	*do.*
Cox, C. C.	*Easton.*
Crane, W. B.	*Baltimore.*
Dallam, William M.	*Harford Co.*
Davis, William H.	*Baltimore.*
Dawson, James	*St. Michael's, Talbot Co.*
Donaldson, Francis	*Baltimore.*
Dorsey, Lloyd	*Frederick.*
Dulin, Alexander F.	*Baltimore.*
Dunbar, John R. W.	*do.*

Duvall, E. P.	*Baltimore.*
Duvall, W.	*Washington, Montgomery Co.*
Field, Philip S.	*Baltimore.*
Fonerden, John	*do.*
Frick, Charles	*do.*
Gibson, George S.	*do.*
Gibson, J. Grigg	*Fredericktown.*
Gilman, J.	*Baltimore.*
Goldsborough, H. T.	*Easton, Talbot Co.*
Grieves, H. G.	*Cambridge.*
Gunn, John P.	*Baltimore.*
Handy, Samuel K.	*Princess Ann.*
Hardcastle, E. M.	*Trappe.*
Harris, Chapin A.	*Baltimore.*
Hebb, T. W.	*Mount Olive.*
Hemsley, W.	*Caroline Co.*
Hintze, F. E. B.	*Baltimore.*
Hopkins, Joel	*Elkridge Landing, Howard Co.*
Houck, J. W.	*Baltimore.*
Inloes, H. A.	*do.*
Jameson, sen., Horatio G.	*do.*
†**Jenkins**, Solomon M.	*Easton.*
Johnstone, C.	*Baltimore.*
Kemp, W. M.	*do.*
Kennard, T. C.	*Harmony.*
Kennedy, S. D.	*Baltimore.*
Kinneman, P. S.	*do.*
Kinney, jr., William	*do.*
Laurence, G. W.	*Catonsville.*
Leonard, William T.	*Baltimore.*
McKew, D. I.	*do.*
Macgill, C.	*Hagerstown,*
Martin, Thomas W.	*Dorchester Co.*
Matthews, Thomas	*Milestown.*
Miltenberger, G. W.	*Baltimore.*
Monkur, John C. S.	*do.*
Monmonier, J. F.	*do.*
Morgan, G. E.	*do.*
Murray, R. (U. S. A.)	*do.*
Muse, J. A.	*Cambridge.*
O'Donnel, D. A.	*Baltimore.*

Piggot, A. S.	*Baltimore.*
Pinckney, Ninian (U. S. N.)	*Annapolis.*
Power, William	*Baltimore.*
Riley, William	*do.*
Roberts, George C. M.	*do.*
Robinson, Alexander C.	*do.*
Roby, Joseph	*do.*
Sappington, J. K.	*Havre-de-Grace.*
Sappington, Thomas	*Liberty, Frederick Co.*
Smith, Nathan R.	*Baltimore.*
Smith, Samuel P.	*Cumberland.*
Steiner, L. H.	*Baltimore.*
Steuart, R. S.	*do.*
Stevenson, J. S.	*do.*
Stokes, William H.	*do.*
Teackle, John N.	*do.*
Theobald, Elisha W.	*do.*
Thomas, Richard H.	*do.*
Tyler, Samuel	*Frederick City.*
Warfield, Jesse L.	*Westminster, Carroll Co.*
Webster, John Lee	*Baltimore.*
White, A. M.	*Easton.*
White, S. N. C.	*Pooleville.*
Williams, W.	*Somerset Co.*
Wilson, H. P. C.	*Baltimore.*
Womble, P. M.	*do.*
Wroth, Peregrine	*Chestertown.*
Wynne, James	*Baltimore.*
Yeates, John L.	*do.*

DISTRICT OF COLUMBIA.

Antiselle, Thos.	*Washington.*
Berry, Wm. H.	*do.*
Bohrer, B. S.	*Georgetown.*
Boyle, Cornelius	*Washington.*
Busey, S. C.	*do.*
Coolidge, R. H.	*do.*
Dove, G. M.	*do.*
Duhamel, W. J. C.	*do.*
Eliot Johnson,	*do.*

Garnett, A. Y. P.	*Washington.*
Hall, J. C.	*do.*
Hellen, B. J.	*do.*
Holston, I. G. F.	*do.*
Johnston, William P.	*do.*
Jones, W.	*do.*
Lindsley, Harvey	*do.*
Lieberman, C. H.	*do.*
Magruder, Hez.	*Georgetown.*
May, J. F.	*Washington.*
Miller, Thomas	*do.*
Morgan, James E.	*do.*
Nichols, C. H.	*do.*
Richards, Jno.	*do.*
Riley, J. C.	*do.*
Riley, Joshua	*Georgetown*
Semmes, A. J.	*Washington*
Stone, Robert K.	*do.*
Thomas, John M.	*Georgetown*
Tyler, Grafton	*do.*
Waring, I. J.	*Washington*
Young, N.	*do.*

VIRGINIA.

Allen, B. W.	
Ashby, C. H.	*Culpepper*
Atkinson, Thomas P.	*Danville.*
Barr, S. B. F. C.	*Big Sprin*
Bates, W. J.	*Wheeling.*
Belt, H. S.	*Pittsylvan*
Bolton, James	*Richmond*
Brooks, John N.	*do.*
Brown, I. C.	*Alexandri*
Browne, O. A.	*Hicksford*
Brown, P. F.	*Acowac.*
Burruss, J. L.	*Louisa C.*
Cabell, J. G.	*Richmon*
Cabell, James L.	*Universit*
Carmichael, George F.	*Frederick*
Cochran, William B.	*Loudon C*

Coleman, J. C.	*Richmond.*
Cooke, A. T. M.	*Norfolk.*
Corbin, G. Lane	*Half-Way House, York Co.*
Cox, Thomas E.	*Richmond.*
Craghead, W. G.	*Danville.*
Creigh, Thomas	*Louisburg.*
Cunningham, Jno. A.	*Richmond.*
Dillon, A. S.	*Faronville.*
Dorset, J. L.	*Genito, Powhatan Co.*
Dove, James	*Richmond.*
Dove, Jno.	*do.*
Faunt Le Roy, John	*White Post, Clarke Co.*
Frissel, John	*Wheeling.*
Gibson, Charles Bell	*Richmond.*
†Gooch, P. Claiborne	*do.*
Hancock, F. W.	*do.*
Harrison, E. J.	*Cartersville P. O., Cumberland.*
Haskins, W. D.	*Richmond.*
Haxall, Robert W.	*do.*
Hildreth, E. A.	*Wheeling.*
Houston, M. H.	*do.*
Howard, Henry	*University of Virginia.*
Hupp, I. C.	*Wheeling.*
Hurt, J. M.	*Halloway City.*
†Johnson, Carter P.	*Richmond.*
Johnson, James	*Hicksford.*
Joynes, Levin S.	*Richmond.*
Kemper, Charles R.	*Woodville, Rappahannock Co.*
Lake, R. P.	*Richmond.*
Lee, George	*Leesburg, Loudon Co.*
Leigh, H. G.	*Petersburg.*
Lewis, M. M.	*Alexandria.*
Lewis, T.	*King and Queen, Stevensville P. O.*
Little, John	*Richmond.*
Lumpkin, Jno. G.	*Hanover.*
Lyle, Jas.	*Prince Edward.*
Magill, Henry D.	*Leesburg.*
Mason, A. H.	*Falmouth.*
†Massie, H.	*Charlottsville.*
McCaw, J. B.	*Richmond.*
McElhenny, S. W.	*Wheeling.*

McGuire, Hugh H.	*Winchester.*
Meriwether, W. D.	*Richmond.*
Merritt, A. T. B.	*do.*
Mettauer, J. P.	*Prince Edward C. H.*
Mills, Charles S.	*Richmond.*
Moore, W. J.	*Norfolk.*
Morrison, E. A.	*Lawrence.*
Moseley, W. P.	*Buckingham.*
Nicholson, G. L.	*Middlesex Co.*
Parker, W. W.	*Richmond.*
Patrick, S.	*Kanawha C. H.*
Patteson, Samuel A.	*Manchester, Chesterfield.*
Patteson, W. A.	*Richmond.*
Payne, A. S.	*Paris, Fauquier Co.*
Peebles, J. F.	*Petersburg.*
Peticolas, A. E.	*Richmond.*
Phillips, W. H.	*Sublett's P. O., Powhatan Co.*
Pollard, Thos.	*Richmond.*
Powell, H. B.	*Alexandria.*
Powell, J. F.	*Middleburg.*
Power, R. H.	*Yorktown.*
Quarles, Charles	*Mechanicsville, Louisa Co.*
Randolph, Robert C.	*Mellwood P. O., Clarke Co.*
Roddey, F. W.	*Richmond.*
Rogers, R. E.	*University of Virginia.*
Schoolfield, I. N.	*Petersburg.*
Scott, Martin P.	*Richmond.*
†Selden, Henry	*Norfolk.*
Selden, William	*do.*
Silvester, R. W.	*do.*
Smith, J. W.	*Petersburg.*
Snead, Albert	*Richmond.*
Spencer, P. C.	*Petersburg.*
Tabb, J. Prosser	*Gloucester Co.*
Taylor, Kidder R.	*Columbia.*
Taylor, W. H.	*Richmond.*
Terrill, G. F.	*Caroline Co.*
Thweatt, J. J.	*Petersburg.*
Trent, W. W.	*Richmond.*
Trent, P.	*do.*

†Trigg, Daniel	*Abingdon.*
Tucker, A. B.	*Winchester.*
Tucker, David H.	*Richmond.*
†Upshur, George L.	*Norfolk.*
Walke, J. Wistar	*Chesterfield.*
Walshe, Samuel	*Prince George Co.*
Wellford, Beverley R.	*Fredericksburg.*
Wellford, J. S.	*do.*
White, Luke	*Petersburg.*
Williman, A. B.	*Norfolk.*
Wilson, W. E.	*Richmond.*
Wilson, G. A.	*do.*
Wily, J. B.	*Macon.*
Wortham, A. G.	*Richmond.*
Worsham, H. C.	*Dinwiddie.*
Yearby, George T.	*Eastville, Northampton.*

NORTH CAROLINA.

Belt, H. Singleton	*Winston, Forsyth C. H.*
Dewey, C. F.	*Goldsboro'.*
Dickson, J. H.	*Wilmington.*
Erwin, J. S.	*Marion.*
Gibbon, J. H.	*Charlotte.*
Jones, J. B.	*Chapel Hill.*
Mabrey, B. W.	*Tarboro'.*
Manson, O. F.	*Lynesville.*
Mercer, Jno. R.	*Tarborough.*
McKee, W. H.	*Raleigh.*
McKee, W. L.	*Morgantown, Burke Co.*
Myers, J. G. B.	*Washington.*
Norwood, Walter A.	*Hillsboro'.*
Pierce, A. B.	*Halifax.*
Pittman, Newson J.	*Tawboro.*
Summerell, J. I.	*Salisbury.*
Thomas, Wm. Geo.	*Tarborough.*
Thomas, W. G.	*Wilmington.*
Thompson, Jno. R.	*Raleigh.*
Tull, J. G.	*Newbern.*
Warren, T. D.	*Edenton.*

Warren, W. C.	*Edenton.*
Webb, William	*Hillsboro'.*

SOUTH CAROLINA.

Bailey, R. S.	*Charleston.*
Barker, Sandford W.	*do.*
Barratt, Jno. P.	*Abbeville.*
Bellinger, Jno.	*Charleston.*
Bradley, B. W.	*King's Tree, Williamsburg.*
Cain, D. J.	*Charleston.*
Clawson, C. L.	*Nation Ford.*
Coffin, Amory	*Aiken.*
Crane, Joseph S.	*Columbia.*
Dawson, J. L.	*Charleston.*
De Saussure, H. W.	*do.*
Dickson, Samuel Henry	*do.*
Elfe, Edward	*do.*
Elliott, Thomas A.	*Orangeburg.*
Fair, Samuel	*Columbia.*
†Flagg, Beling	*Charleston.*
Ford, Wm. H.	*do.*
Frost, Henry R.	*do.*
Gaillard, Peter C.	*do.*
Gaston, J. McF.	*Columbia.*
Geddings, E.	*Charleston.*
Geddings, J. F. M.	*do.*
Gibbes, N. H.	*St. Helena.*
Gibbs, Robt. W.	*Columbia.*
Goodwyn, T. J.	*Orangeburg.*
Gourdin, Saml.	*Charleston.*
Happoldt, C.	*do.*
Hazell, Andrew	*All Saints.*
Henderson, E. R.	*Blue House P. O.*
Holbrook, J. E.	*Charleston.*
Hook, J. H.	*St. Matthew's.*
Horlbeck, Elias	*Charleston.*
Horlbeck, W. C.	*do.*
Jervey, James P.	*do.*
Kinlock, R. A.	*do.*
Lebly, Robert	*do.*

Lynch, John	*Cheraw.*
Marshall, J. W. W.	*Abbeville C. H.*
May, Jno.	*St. George's P. O.*
Mayes, J. A.	*Maysville.*
McKain, Wiley J.	*Camden.*
Michel, R. F.	*Charleston.*
Michel, M.	*do.*
Miller, W. C.	*Georgetown.*
†Mitchell, Edward	*Edisto.*
Mitchell, J. S.	*Charleston.*
Mittag, J. F. G.	*Lancaster.*
Mobley, W. W.	*Lancasterville.*
Moore, M. S.	*Stateburg, Sumter Co.*
Moultrie, James	*Charleston.*
Moultrie, W. L.	*St. John's, Berkley.*
Muller, G.	*Lexington.*
Ogier, T. L.	*Charleston.*
Porcher, Francis Y.	*do.*
Porcher, F. Peyre	*do.*
Prioleau, J. Ford	*do.*
Prioleau, Thomas E.	*do.*
Purchin, F.	*do.*
Ravenel, St. Julien	*do.*
Ready, J. C.	*Edgefield.*
Robertson, F. M.	*Charleston.*
Robertson, T. S.	*Winsboro'.*
Rodrigues, B. A.	*Charleston.*
Saussure, H. W.	*do.*
†Simons, T. Y.	*do.*
Smith, Thomas	*Society Hill.*
Talley, A. N.	*Columbia.*
Waring, Morton	*Black Oak.*
White, O.	*Charleston.*
Williams, Alexander	*Chesterfield.*
Winthrop, Henry	*Charleston.*
Wragg, William F.	*do.*

GEORGIA.

Arnold, Richard D.	*Savannah.*
Banks, J. T.	*Zebulon.*

Benson, J. W.	*Savannah.*
Black, R. C.	*Augusta.*
Boring, Jesse	*La Grange.*
Boyd, A. M.	*Cave Spring, Floyd Co.*
Broadhurst, Wm.	*Augusta.*
Brown, Pike	*Savannah.*
Bullock, W. Gaston	*do.*
Campbell, H. F.	*Augusta.*
Campbell, Robert	*do.*
Colley, F. S.	*Monroe.*
Davnall, T. M.	*Atlanta.*
Dugas, L. A.	*Augusta.*
Eve, Joseph A.	*do.*
Ford, L. D.	*do.*
Garvin, J. P.	*do.*
Gilbert, J. C.	*Perry.*
Green, James N.	*Macon.*
Harris, Stephen N.	*Savannah.*
Harris, Juriah	*Augusta.*
Hofey, Thomas	*Columbus.*
Hollingsworth, W. T.	*Buckhead.*
Howard, J. Gordon	*Savannah.*
Jones, W. B.	*Atlanta.*
Jones, W. S.	*Augusta.*
Kollock, Phineas M.	*Savannah.*
Le Hardy, J. C.	*do.*
Logan, J. P.	*Atlanta.*
Means, A. H.	*Augusta.*
Moore, Richard D.	*Athens.*
Nottingham, C. B.	*Macon.*
Ogilby, Hugh J.	*Madison.*
Oliver, M. H.	*Atlanta.*
Padelford, Geo. P.	*Savannah.*
Phinizy, T. B.	*Augusta.*
Posey, John F.	*Savannah.*
Powell, Thos. S.	*Sparta.*
Powers, N. F.	*Harrison.*
Quintard, C. T.	*Roswell.*
Read, James B.	*Savannah.*
Richardson, C. P.	*do.*
Robertson, J. G.	*do.*

Ruffin, W. R.	*Augusta.*
Simmons, J. N.	*Griffin.*
Smith, B. M.	*Atlanta.*
Thompson, E. J.	*Augusta.*
Tufts, Johnson B.	*Savannah.*
Walton, C. R.	*Augusta.*

ALABAMA.

Alexander, Abm. F.	*Eutaw.*
Anderson, L. H.	*Sumterville.*
Anderson, W. H.	*Mobile.*
Bass, W. J.	*Stevenson.*
Blakey, Boling A.	*Montgomery.*
Boling, Wm. M.	*do.*
Cabell, P. H.	*Selma.*
Clanton, S. W.	*Warsaw.*
Cotnam, T. T.	*Stevenson.*
Cook, Jno. B.	*Bellefont.*
Dement, J. J.	*Meridianville.*
Denny, A.	*Suggsville.*
English, I. A.	*Cahaba.*
Gordon, F. E.	*Marion.*
Hargraves, J. T.	*Florence.*
Johnson, W. B.	*Marion, Perry Co.*
Jones, Benjamin R.	*Montgomery.*
Leftwich, W. D.	*Huntsville.*
Lopez, A.	*Mobile.*
Malone, T. Stith	*Athens.*
Meriwether, G.	*Line Creek.*
Miller, R.	*Mobile.*
Morris, J. Webb	*Courtland.*
Norris, G. D.	*New Market.*
Percival, C. F.	*Lowndes Co.*
Reese, W. P.	*Selma.*
Sowell, J. F.	*Athens.*
Thorton, Wm. H.	*Eufaula.*
Winn, P. C.	*New Berne.*

LOUISIANA.

Barton, Edward H.	*New Orleans.*
Beard, C.	*do.*
†Carpenter, William M.	*do.*
Dowler, Bennett	*do.*
Fenner, E. D.	*do.*
†Harrison, J.	*do.*
Jones, James	*do.*
New, Robert A.	*Mansfield.*
Nott, G. A.	*New Orleans.*
Richardson, J. G.	*do.*
Scruggs, S. O.	*Clantonville.*
Simonds, J. C.	*New Orleans.*

MISSISSIPPI.

Cain, J. S.	*Pontotoc.*
Divine, K. C.	*Sharon.*
†Grafton, Thomas J.	*Rodney.*
Keirn, G.	*Lexington, Holmes Co.*
Lowe, John T.	*Aberdeen.*
Shufford, F. B.	*Holly Springs.*

TENNESSEE.

Abernathy, J. J.	*Hockerville.*
Atchinson, T. A.	*Nashville.*
Avent, B. W.	*Murfreesborough.*
Baskette, W. T.	*do.*
Bethshares, H. H.	*Nashville.*
Bowling, W. K.	*do.*
Boyd, J. M.	*Knoxville.*
Brannock, J. M.	*McLemonsville.*
Buchanan, A. H.	*Nashville.*
Burford, J. S.	*Whiteville.*
Callander, Jno. H.	*Nashville.*
Cheatham, Jno. L.	*do.*
Cheatham, W. A.	*do.*
Childress, W. H.	*do.*
Clayton, H. H.	*Murfreesboro'.*

Clements, H. M.	*Clementsville.*
Clements, W. M.	*Gainsboro'.*
Cliff, D. B.	*Franklin.*
Conwell, Ira	*Nashville.*
Currey, R. O.	*Knoxville.*
Dabney, C. R.	*Clarksville.*
Dashiel, W. B.	*Shelbyville.*
Davis, P. W.	*Chapel Hill.*
Eppherson, J. P.	*Pulaski.*
Estill, Walace	*Winchester.*
Evans, R. F.	*Shelbyville.*
Eve, Paul F.	*Nashville.*
Ewing, Andrew B.	*Franklin.*
Ford, Jno. P.	*Nashville.*
Foster, R. C.	*do.*
Grant, George	*Memphis.*
Grant, Geo. R.	*do.*
Guthrie, C. B.	*do.*
Haggard, W. D.	*Gallatin.*
Harris, S. H.	*Nashville.*
Harris, Zeno	*Memphis.*
Haskins, E. B.	*Clarksville.*
Henderson, Eugene	*Murfreesboro'.*
Hoyte, Jas. W.	*Nashville.*
Illson, B. C.	*Lebanon.*
Jennings, Thos. R.	*Nashville.*
Johnston, J. L. C.	*Clarksville.*
Jones, A.	*Shelbyville.*
Jones, W. P.	*Nashville.*
Kelly, John D.	*do.*
Kennedy, Thos. J.	*Cornersville.*
Lawrence, J. M.	*Nashville.*
Lenoir, B. B.	*Lenoir P. O.*
Lindsley, J. B.	*Nashville.*
Lipscomb, Thomas	*Shelbyville.*
Litton, A.	*Nashville.*
Logue, J.	*Rural Hill.*
Long, J. A.	*Cantrel Cross Roads.*
McMurray, S. T.	*Spring Hill.*
McNutt, J. W.	*Kingston.*
Maddin, Thos. L.	*Nashville.*

Malone, H. B.	*Gallatin.*
Manlove, J. E.	*Nashville.*
Martin, Robert	*do.*
Mayfield, Geo. A. I.	*do.*
Mayfield, S. S.	*do.*
Millington, John	*Memphis.*
Moore, W. P.	*Mitchelville.*
Morton, Jno. H.	*Nashville.*
Murrell, T. C.	*Winchester.*
Newman, J. C.	*Nashville.*
Owen, Richard	*do.*
Park, Jno. S.	*ranklin.*
Perkins, N. C.	*do.*
†Porter, R. M.	*Nashville.*
Ransom, M.	*Murfreesboro'.*
Ramsey, Frank A.	*Knoxville.*
Rodgers, Jas.	*do.*
Senter, W. D.	*Hannas P. O.*
Smith, G. F.	*Somerville.*
Smith, Milo	*Chattanooga.*
Shanks, Lewis	*Memphis.*
Stockard, W. P.	*Mount Pleasant.*
Stroud, F. B.	*Gladeville.*
Thomas, N. L.	*Clarksville.*
Towns, J. F.	*Farmville.*
Watson, Jno. M.	*Nashville.*
Wharton, S. L.	*do.*
Whitaker, H. M.	*Clarksville.*
White, R. G. P.	*Pulaski.*
Winston, C. K.	*Nashville.*
Winston, Jno. D.	*do.*
Woodson, T. M.	*Hannas P. O., Sum*
Woodward, P. S.	*Nashville.*

KENTUCKY.

Almon, L. E.	*Underwood.*
Annan, Samuel	*Hopkinsville.*
Atchinson, W. A.	*Bowling Green.*
Baily, J. R.	*Russelville.*
Bell, T. S.	*Louisville.*

Bemiss, S. M.	*Louisville.*
Blackburn, C. J.	*Covington.*
Bradford, J. T.	*Augusta.*
Breckinridge, R. J.	*Louisville.*
Bush, J. M.	*Lexington.*
Chambers, Wm. M.	*Covington.*
Chipley, W. S.	*Lexington.*
Cook, A. B.	*Louisville.*
Davis, E. G.	*Underwood.*
Edwards, R. A.	*Wallon, Boone Co.*
Evans, Asbury	*Covington.*
Fitch, G. N.	*Logan's Port.*
Fleming, Jno. T.	*Flemingbury.*
Flint, J. B.	*Louisville.*
Freeman, D. L.	*Floydsburg.*
Gaines, R. W.	*Hopkinsville.*
Goodloe, A. W.	*Louisville.*
Grubbs, T. H.	*Russellville.*
Holt, W. D.	*Covington.*
Johnston, J. C.	*Louisville.*
Lincoln, J.	*do.*
Mattingley, C. P.	*Bardstown.*
Miller, Henry H.	*Louisville.*
Moore, Thomas J.	*Harrodsburg.*
Norwood, Walter A.	*Henderson.*
Porter, L. C.	*Bowling Green.*
Powell, L.	*Louisville.*
Raphael, B. J.	*do.*
Ray, L. G.	*Paris, Bourbon Co.*
Richardson, S. B.	*Louisville.*
Settle, T. L.	*do.*
Singleton, J. W.	*Smithland.*
Spillman, C. H.	*Harrodsburg.*
Stevens, B. L.	*Union, Boone Co.*
Sutton, W. L.	*Georgetown.*
Thomson, D. D.	*Louisville.*
Wood, B. S.	*Trenton.*
Yandell, D. W. L.	*Louisville.*
Yandell, L. P.	*do.*

Armor, S. G.	*Cincinnati.*
Arons, Jno. J.	*do.*
Austin, A.	*Sandusky.*
Awl, William M.	*Columbus.*
Ayres, A.	*Greenville.*
Baird, James M.	*Bourneville.*
Baker, Abraham H.	*Cincinnati.*
Baker, T. H.	*Wayne Co.*
Battles, W. S.	*Edinburg.*
Bigelow, J. M.	*Lancaster.*
Boerstler, G. H.	*do.*
Bonner, S.	*Cincinnati.*
Branson, Smith	*Chester Hill.*
Briggs, J. M.	*Marion.*
Brown, B. S.	*Bellefontaine.*
Buckner, Philip J.	*Georgetown.*
†Butterfield, J.	*Columbus.*
Carey, Abel	*Salem.*
Carey, Harvey G.	*Dayton.*
Carroll, Thomas	*Cincinnati.*
Carson, William	*Chillicothe.*
Carter, Francis	*Columbus.*
Charters, W. M.	*Lebanon, Warren Co.*
Clements, Joshua	*Dayton.*
Clendennin, William	*Cincinnati.*
Cochrane, Charles	*Sandusky.*
Colton, C. D.	*Marietta.*
Comegys, C. G.	*Cincinnati.*
Conklin, H. Smith	*Sidney, Shelby Co.*
Coons, Israel A.	*Dayton.*
Corson, J.	*Portsmouth.*
Cotton, J. D.	*Marietta.*
Cox, D. A.	*New Paris.*
Crews, James H.	*Upshur, Preble Co.*
Crume, Pliny M.	*Eaton, Preble Co.*
Dandridge, A. S.	*Cincinnati.*
Dawson, Jno.	*Columbus.*
Dawson, J. R.	*Bellbrook.*
Delamater, Jacob J.	*Cleveland.*

Dodge, J. S.	*Cincinnati.*
Dorsey, G. Volney	*Piqua.*
†Drake, Daniel	*Cincinnati.*
Dunahoe, H. J.	*Sandusky.*
Dunlap, A.	*Ripley.*
Eaton, T. J.	*New Paris, Preble Co.*
Effinger, M.	*Lancaster.*
Ferris, O.	*Upper Sandusky.*
Ferris, S.	*New Westville.*
Fisher, Elias	*Waynesville, Warren Co.*
Ford, P. G.	*Cincinnati.*
Fries, George	*Hanovertown.*
Fyffe, E. P.	*Urbana.*
Gard, J. N.	*Greenville.*
Gaston, Ephraim	*Morristown.*
Gilchrist, R. S.	*De Graff.*
Gillet, B.	*Springfield.*
Gordon, Thomas W.	*Georgetown.*
Grant, Charles	*Cincinnati.*
Griswold, L. D.	*Elyria.*
Grundy, Richard	*Columbus.*
†Harrison, John P.	*Cincinnati.*
Heighway, A. E.	*do.*
Henderson, J. P.	*Newville.*
Heterick, A. B.	*Georgtown.*
Hills, Ralph	*Columbia.*
†Howard, Richard L.	*Columbus.*
Huestis, Isaac	*Chester Hill.*
Hughes, C. B.	*Cincinnati.*
Hunt, Samuel P.	*Morrow, Warren Co.*
Hurxthal, Frederick T.	*Massillon.*
Janes, W. W.	*Toledo.*
Johnston, A. M.	*Cincinnati.*
Jones, C.	*West Union.*
Jones, W. W.	*Toledo.*
Judkins, David	*Cincinnati.*
Judkins, J. P.	*do.*
Judkins, William	*do.*
Kable, W. R.	*Bellebrook.*
Koehne, H. F.	*Dayton.*
Kreider, M. Z.	*Lancaster.*

Safford, R.	*Putnam.*
Sams, C. C.	*Hillsborough.*
Sayles, J. A.	*Cleveland.*
Scarff, W. D.	*Bellefontaine.*
Schenk, C. F.	*Columbus.*
Schenk, W. L.	*Franklin.*
Sheets, L. D.	*Dayton.*
Sheldon, B.	*Cleveland.*
Sibley, E. H.	*Lodi, Medina Co.*
Slusser, Lewis	*Canton.*
Smith, A. C.	*Medina C. H.*
Smith, Edwin	*Dayton.*
Smith, John A.	*Piqua.*
Smith, J. B.	*Cincinnati.*
Smith, Samuel M.	*Columbus.*
Smith, S. Hanbury	*do.*
Spillman, Henry	*Medina.*
Steele, H. K.	*Dayton.*
Stevens, Joshua	*Lebanon.*
St. John, Samuel	*Cleveland.*
Strader, D. P.	*Cincinnati.*
Taggart, W. W.	*Smithville, Wayne Co.*
Taliaferro, W. I.	*Cincinnati.*
Tappan, B.	*Steubenville.*
Taylor, James	*Cincinnati.*
Thompson, J. B.	*Columbus.*
Thompson, R.	*do.*
Tilden, D.	*Sandusky, Erie Co.*
Trevitt, Wm.	*Columbus.*
Tweed, T. M.	*Eckmansville.*
Updegraff, J. T.	*Mount Pleasant.*
Vanharlingen, I.	*Lebanon.*
Vattier, J. L.	*Cincinnati.*
Walker, J. P.	*do.*
Waterman, L. D.	*do.*
West, Henry	*Clairsville, Belmont Co.*
White, James	*Lancaster.*
White, John F.	*Cincinnati.*
White, J. W.	*Stockport.*
Williams, I. C.	*Bloomington.*
Wood, Thomas	*Cincinnati.*

Woodward, Charles	*Cincinnati.*
Wright, James	*Belmont.*
Wright, M. B.	*Cincinnati*

INDIANA.

Ayers, H. P.	*Fort Wayne.*
Beck, J. C.	*Cadiz.*
Boyd, S. S.	*Jacksonburg.*
Brelsford, Joseph	*Plymouth.*
Bullard, Talbot	*Indianapolis.*
Cameron, R. A.	*Valparaiso.*
Clapp, A.	*New Albany.*
Clapp, W. A.	*do.*
Cogley, T. J.	*Madison.*
Darnall, M. D.	*Bainbridge.*
Dicken, James L.	*Somerset.*
Dickey, William	*Dalton.*
Florrer, T. W.	*Alamo.*
Haymond, R.	*Brookville.*
Hitt, W. W.	*Vincennes.*
Holt, Willis W.	*do.*
Horne, S. S.	*Marion.*
Humphries, Lewis	*South Bend.*
Hutchinson, David	*Mooresville.*
John, H. V. V.	*Indianapolis.*
Johnson, Nathan	*Cambridge City, W*
Kersey, Vierling	*Milton.*
Latta, Milton M.	*Goshen.*
Leedy, J. K.	*Warsaw, Kosciusk*
Leonard, S. E.	*New Albany.*
Lomax, William	*Marion.*
Lyons, W. B.	*Huntington.*
Martin, William H.	*Rushville.*
Maclean, George M.	*New Albany.*
Mears, G. W.	*Indianapolis.*
Mendenhall, Isaac	*Ashland, Henry* (
Meeker, David	*Laport.*
Meekes, D.	*do.*
Morgan, Daniel	*Evansville.*
†Mothersett, I. L.	*Indianapolis.*

Mullen, Alexander J.	*Napoleon, Ripley Co.*
Murphy, Edward	*New Harmony, Posey Co.*
Parry, Charles	*Indianapolis.*
Patterson, R. J.	*do.*
Pennington, Joel	*Milton, Wayne Co.*
Ritter, Levi	*Plainfield.*
Ronalds, Hugh	*Evansville.*
Rose, Landon C.	*Laporte.*
Sarber, W. E.	*Palestine.*
Sexton, H. G.	*Rushville.*
Sheets, L. D.	*Liberty.*
Shively, James S.	*Marion, Grant Co.*
Sloan, John	*New Albany.*
Sommes, Joseph	*Vincennes.*
Sutton, George	*Aurora.*
Town, R. R.	*New Albany.*
West, Calvin	*Hagerstown.*
Winton, Wm. R.	*Wabash.*
Woodworth, B. S.	*Fort Wayne.*

ILLINOIS.

Allen, George T.	*Marine.*
Andrews, E.	*Chicago.*
Bailey, F. K.	*Joliet, Will Co.*
Baldwin, S. G.	*Decatur.*
Bane, Wm. M.	*Payson.*
Banks, E. C.	*Charleston.*
Blaney, J. V. Z.	*Chicago.*
Bloodgood, James	*do.*
Brainard, Daniel	*do.*
Bridges, V. R.	*Salisbury.*
Bunce, James	*Galesbury.*
Byford, W. H.	*Chicago.*
Clark, Charles W.	*Rockford.*
Colburn, E. M.	*Peoria.*
Coolidge, Charles	*Warsaw.*
Cooper, E. S.	*Peoria.*
Coopins, P. G.	*Fairweather.*
Crothers, E. K.	*Bloomington.*
Davis, N. S.	*Chicago.*

Page, J. L.	*Chicago.*
Palmer, A. B.	*do.*
Parker, Henry	*do.*
Prince, David	*Jacksonville.*
Quigley, W. C.	*Chicago.*
Ralston, J. N.	*Quincy.*
Robinson, W.	*Dover.*
Rogers, T. P.	*Bloomington.*
Rouse, Rudolphus	*Peoria.*
Shepherd, M.	*Payson, Adams Co.*
Skelling, David	*Winchester.*
Smith, H. M.	*Vincennes.*
Stahl, Adam	*Quincy.*
Steele, James M.	*Grandview.*
Stout, Joseph	*Ottawa.*
Stipp, George W.	*Bloomington.*
Stormont, D. W.	*Grandview.*
Thompson, Samuel	*Albion, Edwards Co.*
Trowbridge, S. J.	*Decatur.*
Varien, Wm.	*Chicago.*
Washburn, Thomas D.	*Lawrenceville.*
Welch, Wm. W.	*La Salle.*
Wickersham, S.	*Chicago.*
White, F. W.	*do.*
Williams, Hezekiah	*Alton.*
Wood, Wm.	*Cairo.*

MISSOURI.

Adreon, Stephen W.	*St. Louis.*
Alleyne, J. S. B.	*do.*
Alexander, John B.	*Lexington.*
Atkinson, J. F.	*do.*
Barnes, Jno.	*St. Louis.*
Barret, R. T.	*do.*
Baumgarten, Fred. E.	*do.*
Chandler, Chas. Quarles	*Rockfort.*
Clarke, R.	*St. Louis.*
Coons, A. J.	*do.*
Cooper, D. M.	*do.*
Currie, Wm. A.	*Jefferson City.*

Wislizénus, Adolphus	*St. Louis.*
Woodson, John C.	*Spencerburg.*

ARKANSAS.

Armstrong, F. W.	*Pine Bluff.*
F. Grundy McGavoch,	*Pecan-Point.*

MICHIGAN.

Allen, J.	*Ann Arbor.*
Andrews, J.	*Pawpaw.*
Arnold, S. R.	*Monro.*
Axford, S. M.	*Flint.*
Barnum, B.	*Schoolcraft.*
Beech, J. H.	*Coldwater.*
Brodie, Wm.	*Detroit.*
Brown, J. A.	*do.*
Christian, E. P.	*do.*
Clapp, H. C.	*Pawpaw.*
Cobb, H. P.	*Detroit.*
Cobb, L. H.	*do.*
Cone, E. D.	*Hillsdale.*
Cox, Edward	*Battle Creek.*
Davenport, Lewis	*Detroit.*
Denton, S.	*Ann Arbor.*
Douglass, S. H.	*do.*
Durton, Samuel	*do.*
Fanner, C. P.	*do.*
French, S. B.	*Battle Creek.*
Gorton, J. C.	*Detroit.*
Gunn, Moses	*do.*
Haze, W. H.	*Farmington.*
Inglis, R.	*Detroit.*
Johnson, G. K.	*Pontiac.*
Kibbie, J.	*Port Huron.*
Kinney, M. C.	*Lapeer.*
Klein, P.	*Detroit.*
Leasia, J. A.	*Williamston.*
Leland, A. L.	*Detroit.*
Leete, Albert E.	*Romeo.*

Ford, E. R.	*Keokuk.*
Francis, E. C.	*do.*
Horr, Asa	*Dubuque.*
Hughes, J. C.	*Keokuk.*
Lewis, R. S.	*Dubuque.*
Lyons, W. B.	*Huntington.*
Malcolm, A. B.	*Dubuque.*
McGugin, D. L.	*Keokuk.*
Rauch, J. H.	*Burlington.*
Sanborn, J. E.	*Keokuk.*
Sanford, John F.	*do.*
Siveter, Thomas	*Salem.*
Van Patten, N.	*Davenport.*
White, J. W.	*Stockport.*
Watson, Wm.	*Dubuque.*

WISCONSIN.

Ayres, D. Cooper	*Green Bay.*
Bartlett, John K.	*Milwaukee.*
Brisbane, W. Henry	*Arena.*
Brown, J. J.	*Madison.*
Castleman, A. L.	*Delafield.*
Chapman, C. B.	*Madison.*
Douseman, John B.	*Milwaukee.*
Ford, J. D.	*Winona.*
McKinley, Hays	*Kenosha.*
Pease, C. G.	*Janesville.*
Thorn, Samuel S.	*Milwaukee.*
Wilbur, George	*Mineral Point.*

MINNESOTA TERRITORY.

Le Boutillier, C. W.	*St. Anthony.*
Murphy, John	*do.*
Potts, Thomas R.	*St. Paul.*

CALIFORNIA.

Harvey, O.	*Placerville.*

CHEROKEE NATION.

Ross, R. D. — *Grand Sabine.*

UNITED STATES ARMY.

Cuyler, J. M.
Jarvis, N. S.
McLaren, A. N.
Moses, Israel
Porter, J. B.
Tripler, Chas.
Wood, R. C.

UNITED STATES NAVY.

Barrington, Samuel
Clymer, Geo.
Delany, M. G.
Dillard, T.
Greene, J. M.
Horner, G. R. B.
Lockwood, John
Maxwell, C. D.
Pinkney, Ninian
Wood, W. Maxwell.

FOREIGN.

W. F. Atlee,
A. J. Semmes,
R. R. McIlvaine,
W. H. Berry,
N. J. Pittman,
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